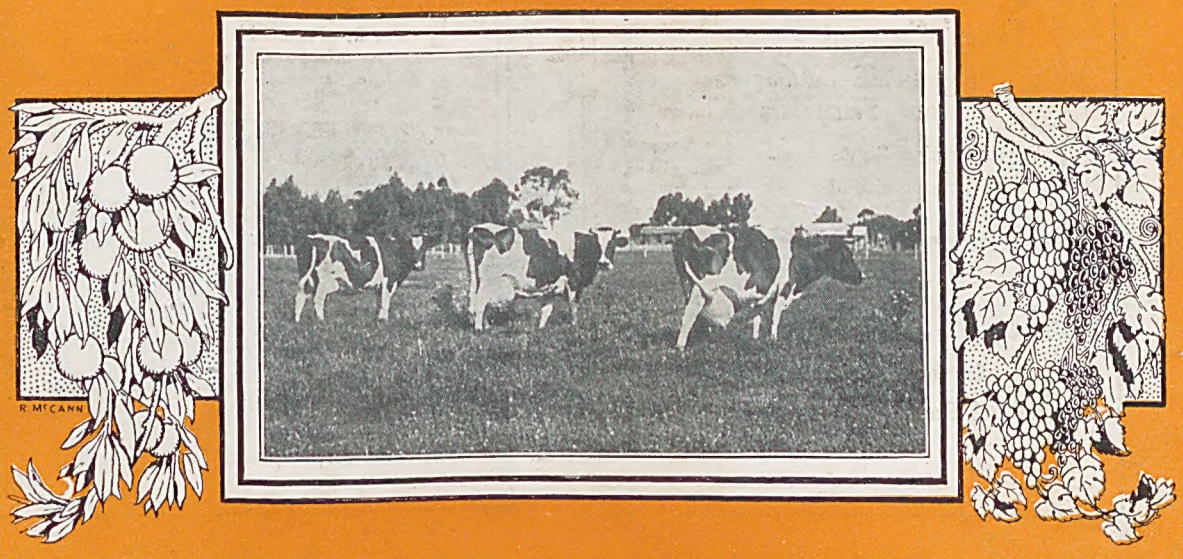
VOL. XXX. [Registered at the General Post Office, Melbourne, for transmission by Post as a Newspaper.] PART 3.

3 MAR 1932

THE JOURNAL OF THE DEPARTMENT OF AGRICULTURE OF VICTORIA, AUSTRALIA.



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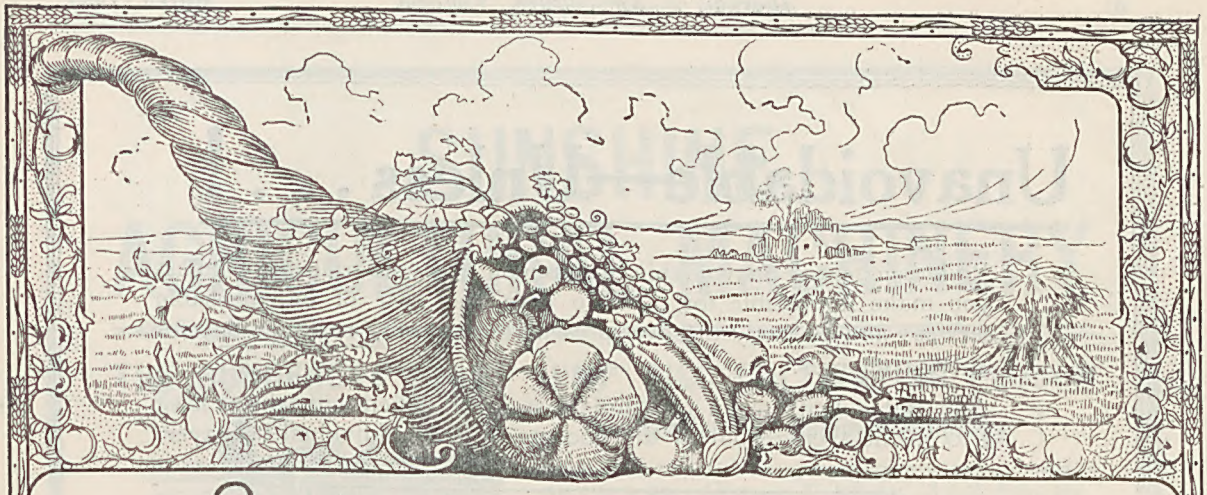

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Issued under the direction of the Hon. W. Slater, M.L.A., Minister of Agriculture.

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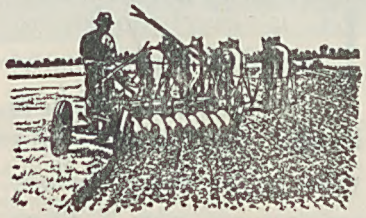

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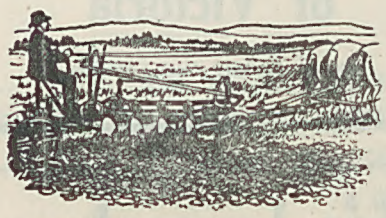

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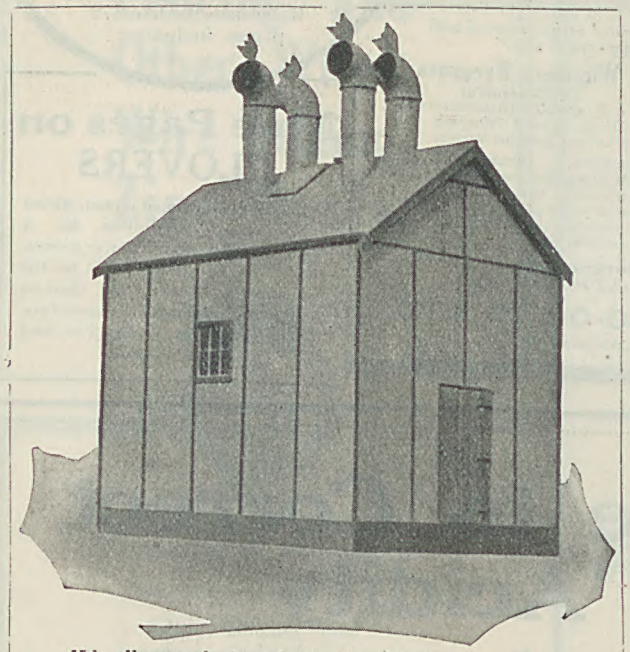

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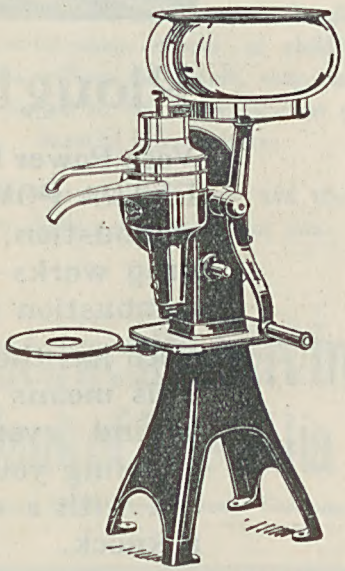

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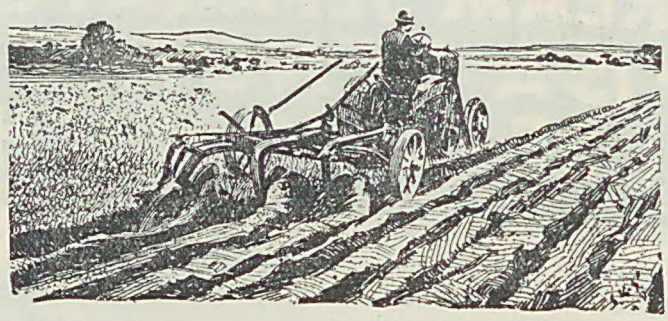

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The Journal of the DEPARTMENT of AGRICULTURE of VICTORIA

Some Common Clovers

THEIR IDENTIFICATION

By A. Morgan, B.Agr.Sc., State Research Farm, Werribee.

IN the irrigation districts of Victoria lucerne, sorghums, and cereals are slowly giving place as pastures to mixtures of grasses and clovers, but the plants composing these mixtures are not by any means as well known as are the crops they are displacing. While it is not suggested that the irrigation farmer should take up the study of botany on this score, there is no doubt that a working knowledge of the appearances, habits, and relative values of the more common clovers and allied plants would prove of great value, particularly in those districts where, as yet, the sowing down of irrigated pasture is regarded as somewhat of an innovation. Until the more valuable pasture plants become widely known, and are designated by the names current in other parts of the State, much confusion and many regrettable mistakes are likely to occur. For example, a case was recently brought under notice, where the resemblance of the heads of Woolly Clover to those of Strawberry Clover was sufficient to cause one farmer to mistake it for the latter. As a result the seed of the Woolly Clover was harvested and sown under the impression that a highly desirable perennial clover was being distributed over the property. A little knowledge of the habit of Strawberry Clover would have prevented this mistake. Similarly, cases have come under notice where attempts to establish permanent pasture have been abortive, and farmers in ignorance have been trying to foster what is only a collection of second-rate, casual, short-term species.

A story is current that a farmer in the north exhibited, all in good faith, a bundle of Melilotus in a competition for the best bundle of lucerne—*and he was awarded the prize.* Yet another instance is of a farmer who noted that his stock ate the short White Clover, but would not touch "that Alsike Clover" which on examination proved to be rank growths of White Clover. In some districts Perennial Red Clover (Cowgrass) is commonly referred to as Strawberry Clover, the mistake no doubt being due to the colour and shape of the flowers

Fig. 1.—Showing creeping stem of White clover with rootlets which are characteristic of White and Strawberry Clovers.

Fig. 2.—Showing different veining in leaves of White Clover (lower) and Strawberry Clover (upper)

of Red Clover. Facts such as these, coupled with the large number of inquirers who brought samples of various clovers, with a request for their identification, to the Better Farming Train during its recent tour, suggested that a service would be rendered to those who were establishing pastures if a simple method of identification of the more common legumes, particularly the clovers and medicks, were presented in a form unburdened by botanical terms.

Owing to the fact that commercial samples of seed of most clovers are actually and unavoidably mixtures of a large number of "strains" or "types," showing in many cases apparently widely diverse characteristics in regard to shape, size, and markings of the leaves and also in regard to the shades of colouring in the flowers, it is necessary to establish as a basis of identification those characters which are not varied to any great extent in those "strains" or "types," and are unaffected by any particular location, manurial treatment, and so on. Since flowers are not always present, we are often forced to depend upon leaf characters such as hairiness, veining, and the like as our main guides, other characters such as shape of leaf, markings, and size being useful as evidence in support or otherwise.

Botanical survey work carried out at the Werribee Research Farm has supplied much data in regard to the identification of the pasture grasses and clovers by means of their stems and leaves alone. It has shown also that the colour and shape of the leaf markings are wholly unreliable as means of distinguishing between the various clovers. This should be of interest to many who hold the opinion that a white marking on the leaf is a constant character for White Clover, or that it is never found on the leaf of Strawberry Clover. Purplish markings on White Clover, and brown markings on Strawberry, are not uncommon. It is not denied that certain strains of White Clover may exhibit a marking of this nature as a constant and reliable feature, but since this appears to be equally true of Strawberry Clover it is found inadvisable to place too much reliance on leaf-markings.

Apart from the interest taken in the development of the various clovers included in newly-sown irrigated pastures, there is also the aspect of the entrance into thinned-out lucerne stands of clovers such as White and Strawberry Clovers, and many lucerne-growers are keenly interested in this gradual unaided change-over from lucerne to pasture, some being apprehensive as to the value of the intruders. It is hoped that, by directing attention to a few of the structural details of these plants, those interested may learn to separate them one from the other by a series of simple tests, the only apparatus required being normal eyesight. After a time, one can dispense with a close examination of the plant, since one learns to add up unconsciously the various features which characterize a particular clover and to recognize it at a glance. It will be found, as one's experience broadens, that no *one* character is *in itself* absolutely reliable, but that the tests to be described are, from a practical stand-point, usually very reliable.

In the following notes, the problem is approached from a difficult angle, that is, when no flowers are present. By this means it is hoped to focus attention on characters which, while not as conspicuous as the flowers, are more reliable guides. It is also assumed that the reader is totally unacquainted with any of the clovers discussed, and comparisons of the various species from the angles

of general habit, colour of flowers, and situations where each is likely to be prominent, are avoided, until simple and definite tests have been applied.

White and Strawberry Clovers.

We will suppose that a portion of the stem of a clover plant in a pre-flowering stage and with a few well-developed leaves is available. The first step should be to note whether the plant is one which spreads by means of creeping stems which send down roots into the soil at frequent intervals along their length. If such is the case the plant is a perennial—either *White Clover* (in which term we include all possible strains of White Clover) or *Strawberry Clover*. (See Fig. 1.) To determine which, it is best to neglect such factors as leaf-markings, size and shape of leaf, since these are very variable. A more reliable method is to hold the leaf up to the light so that the veins of the leaf show up clearly. If the veins are widely spaced, and in the great majority of cases run straight to the edge of the leaf with only one branching, the leaf is from a plant of White Clover. If, in addition, there are no small hairs to be seen on the leafstalk or the under side of the leaf, no further evidence of White Clover is necessary, whether or not the leaf shows a white marking on each leaflet. If the veins are closely spaced, and very much branched, showing a curve from the midrib to the leaf edge, the leaf is from a plant of Strawberry Clover. If, in addition, a few stout hairs occur on the midrib of the leaf on the under side, and more frequently on the leafstalk, we have strong confirmatory evidence of Strawberry Clover. These hairs may be absent, however, without affecting the issue, since the relative hairiness of Strawberry Clover appears to be largely a matter of season of the year, the hairs being more commonly seen in the summer months. The features described above are shown in Fig. 2.

Where their occurrence is brought about naturally, both White and Strawberry Clovers will usually be first noted as patches of a yard or two yards in diameter. In these patches no separate plants will be distinguishable, whereas with all the other clovers likely to be found a patch will readily be seen to consist of an aggregation of single plants. A patch of Strawberry Clover is usually dark-green in colour, and may occur in either a rather damp or a rather dry situation, since this clover has a greater resistance to extremes of wetness and dryness than has White Clover. Both flower almost continuously during the summer months. The flower-heads of White Clover, although *usually* white, *may* be pinkish, and invariably a strong pink or red tinge develops as the flowers wither. At this stage the small flowers at the bottom of the head turn down towards the ground as shown in Fig. 3. The flower-heads of Strawberry Clover are usually pink, but instead of the small flowers turning down at withering they become bladdery, giving the characteristic "strawberry" appearance. Where possible, observations of this kind should be made in conjunction with the tests previously outlined.

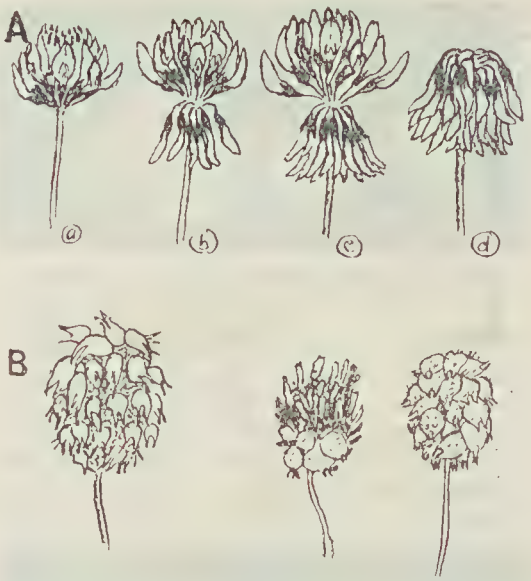


Fig. 3.—Showing various stages in the turning-down of flowers of a White Clover flower-head (A) and the characteristic "bladdery" appearance of a mature Strawberry Clover flower-head (B).

Wild White Clover.

It is not proposed in these notes to deal with the differences which exist between the various well-known strains of these two valuable clovers. The question—"What is the difference between White Clover and Wild White Clover?" has been asked so many times, however, that it seems desirable to touch on the matter here. Much confusion appears to have arisen in the northern settlements because of the fact that White Clover has invaded lucerne

Fig. 4a.—Showing the long stalk of the middle leaflet in Burr Medick.

stands, being particularly prominent in stands which are thinning-out, thus giving rise to the term "wild" White Clover as distinct from White Clover in a seeded pasture. In the main, the plants are those of a strain or type eminently suitable to the particular local conditions, and perhaps in this sense the term

Fig. 4b.—Showing the long stalk of the middle leaflet in Hop Clover.

"wild" may be justifiable. When the seed from old White Clover pastures in England was harvested the seed went into commerce as "Wild White Clover," and was boosted on the score of its greater permanence as compared with White Dutch Clover, the name originally given to the Netherlands strain, but later applied to seed from all European sources.

Fig. 4c.—Showing the long stalk of the middle leaflet in Melilotus.

Improved manurial practice apparently revealed the indigenous English White Clover as a productive type and one better suited to local conditions in Engalnd. The Wild White Clover seed was introduced into Australia and sold at a high price, but inasmuch as the conditions here are so different the special features of this strain were not necessarily a commendation for it under our conditions. White Clover spreads naturally in Gippsland, where the natural climatic conditions are favorable, and the older pastures of that district have a true Wild White Clover which is bigger-leaved than English Wild White. In the north, where conditions are made favorable by irrigation, White Clover spreads, and excellent permanent pastures are seen, but the type conforms more in appearance to the White Dutch Clover and a "giant" form is often encountered (as at Mr. Jackman's farm at Dingee). It is not unlikely that this and the best New Zealand Wild White are very similar.

Fig. 5.—Showing the position of the stipule at the junction of leaf stalk and runner.

To return to the question of identification: Suppose the plant proves on examination to be one which *does not* spread by creeping stems which root at intervals along their length. It

Fig. 6.—Showing shape and veining of stipules of Red Clover.

is obviously an annual, or a perennial which spreads only by seed. The more common members of this group may be subdivided into two sub-groups by a simple test. Compare the length of the stalk of the middle leaflet of the leaf with the lengths of the stalks of the two side leaflets. If the former is two or more times the latter, we are able to say that the plant is either Burr Medick (Trefoil),

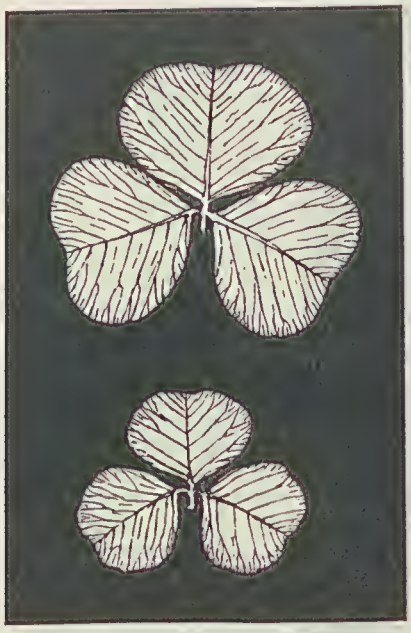


Fig. 7.—Showing shape of leaf of Subterranean Clover.

Spotted Medick (Spotted Trefoil), Melilotus, Hop Clover, or Suckling Clover. (See Fig. 4.) (If the stalk of the middle leaflet is not conspicuously longer than the others, the plant is either Red Clover, Subterannean Clover, Alsike Clover, Cluster Clover, or Woolly Clover.

Red and Subterranean Clovers.

Since the members of the second group are on the whole more important under irrigation conditions, we may proceed with the separation as follows: In the first place, the leaves of Red Clover and Subterranean Clover are densely hairy on the *under* side in *all* cases, and usually on the upper side also, while the leaves of Alsike, Woolly, and Cluster Clovers are smooth. We will suppose the leaf to be hairy, indicating either Red Clover or Subterranean Clover. To distinguish these two clovers, markings and size of leaf are not always satisfactory, and although the shape of the leaf is fairly constant (particularly in Subterranean) it should be used more as a confirmatory test. For accuracy, we are forced to an examination of the plant at those points where the stalks of the leaves join with the main stem (Fig. 5). On all the clovers and medicks, at these points, we find two small leafy organs, known as *stipules,* and since these stipules very often show characters peculiar to the particular kind of clover on which they occur they are useful as a means of identification. Figure 6 illustrates the stipular differences in Red and Subterranean Clovers. It will be noted that the stipule of the Red Clover differs from that of Subterranean in having a long point and in being heavily-veined, the colour of the veins being very often dark-red. The veins of the stipule of the Subterranean Clover, on the other hand, are rather indefinite in character, and not coloured to any greater degree than the rest of the stipule.

The shape of the leaf may now be taken into consideration. It is safe to say that the leaf of Subterranean very seldom shows much difference from that illustrated in Fig. 7, but Red Clover leaves in some cases very closely resemble those of Subterranean in shape, so that in these cases it is necessary to examine the stipules as outlined. The foregoing method is often the sole guide when the plant is very young, but as the plant enlarges striking differences are shown. Red Clover then assumes an erect growth, while Subterranean sends out long rootless runners. While Red Clover bears its flowers in large heads of a purplish colour, at the ends of the stems, Subterranean Clover bears its small whitish (or pink-tinged) flowers in groups of three or four, between the leaves and the runner, at frequent intervals along the latter.

It is only in the high rainfall areas that Red Clover is able to spread naturally, while in the lower rainfall areas Subterranean may become prominent as a result of top-dressing activities. In irrigated pastures the latter, although usually included in the seeding mixture for areas where water is available at short and regular intervals, should not be particularly aggressive—if this occurs it is usually an indication that waterings should be more frequent.

The method employed by Subterranean Clover to re-seed itself is unique—the flower-heads turn down into the soil, often burying the seed to as much as half an inch under moist conditions. This character should not be mistaken for the rooting which takes place along the runners of White and Strawberry Clovers.

Alsike, Woolly and Cluster Clovers.

It now remains to differentiate between the smooth-leaved clovers of this group, viz., Alsike, Woolly, and Cluster Clovers. While this becomes a comparatively easy matter with

Fig. 8.—Showing variation in shape of Red Clover leaves.

practice, and it is possible to show the differences between young plants with the specimens actually in front of one, to attempt briefly to convey the correct impressions to any one unfamiliar with them would be unsatisfactory. With older plants, however, the differences are great. Alsike is normally an erect grower, with flower-heads (usually pink in colour) at the *ends* of the stems, while Cluster and Woolly Clovers are normally prostrate plants with flower-heads at intervals *along* the runners. Like those of White Clover, the small flowers of Alsike turn down towards the ground at withering. It also helps, to remember that in the northern districts, except where actually sown in pasture, Alsike is not likely to be encountered. Both Woolly and Cluster Clovers, however, are widespread over the State, but may be distinguished by their flower-heads, this being a small rather hard green ball in the case of Cluster, and a soft white to pinkish woolly ball in the case of Woolly Clover. Of these two annuals, Cluster is more to be preferred, since it lasts longer into the summer months, but neither is worth root-room on an irrigation block suitable for rye-grass and White Clover pasture.

The Medicks.

We come now to the group in which the stalk of the middle leaflet of the leaf is longer than that of the two side leaflets, and the separation of the various members proceeds in a somewhat similar fashion to that previously outlined. We are required to establish whether the plant is Burr Medick, Spotted Medick, Melilotus, Hop Clover, or Suckling Clover. The first two—Burr Medick and Spotted Medick—are readily separated from the others by the prominent teeth of the stipule, as shown in Fig. 10, and the Spotted Medick is then distinguished from the Burr Medick by the presence of a black spot in a central position on the upper side of each leaflet of the leaf (Fig. 11). Spotted Medick is not generally as highly esteemed as Burr Medick, and the fact that it is occasionally without its distinguishing black spot may cause it to be mistaken for Burr Medick. This contingency cannot be provided for in these notes, however, as the other differences are of a nature not readily detected by the eye.

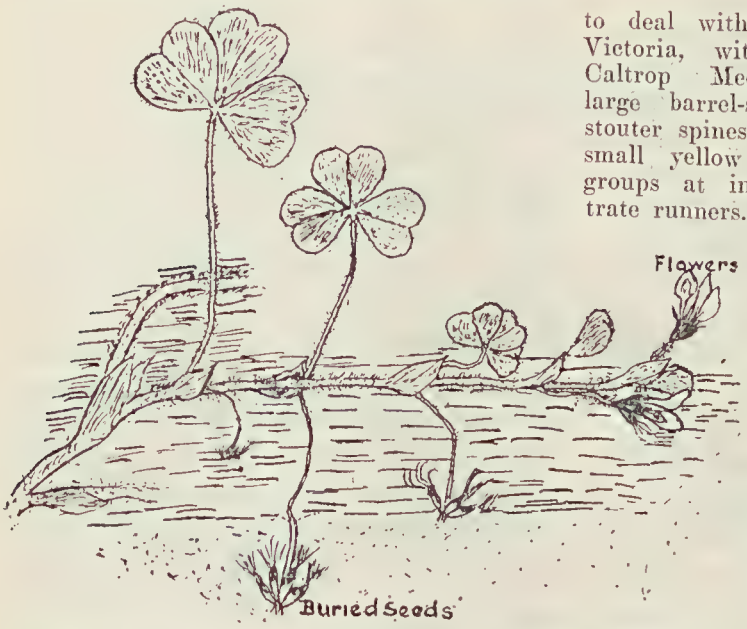


Fig. 9.—Showing the re-seeding habit of Subterranean Clover.

These two plants are, of course, not true clovers in the strictest sense of the term, but their widespread occurrence and economic importance render it necessary to include them here. In the majority of cases we are accustomed to think of Burr Medick or Trefoil as a practically hairless plant bearing its seeds in a spirally-coiled pod with many hooked spines. These spiny pods or "burrs" become entangled in fleeces and cause no little trouble on that account. However, there are varieties of this plant which are densely hairy on the leaves, or in which the burrs have no spines. Nevertheless, the presence of the toothed stipule and the long stalk of the middle leaflet establish these forms as medicks. In view of the greater frequency of occurrence of Burr and Spotted Medicks in comparison with that of other forms, it is unnecessary to deal with the other medicks found in Victoria, with the possible exception of Caltrop Medick, a hairy species with large barrel-shaped burrs with fewer but stouter spines. In the above trefoils, the small yellow flowers are borne in small groups at intervals along the usually prostrate runners.

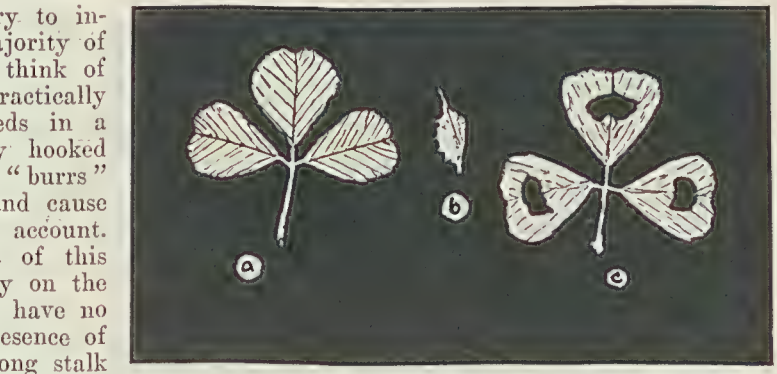


Fig. 11.—Leaves of Burr Medick (a), Spotted Medick (c), and stipule (b).

Fig. 10.—Showing prominent teeth on stipule of Burr Medick.

Melilotus.

Of the three remaining plants —Melilotus, Hop Clover, and Suckling Clover, Melilotus is readily distinguished in both the young and old stages by the strong fragrant odour given off when the leaf is rubbed up in the hand. This plant is normally an erect woody legume, much more robust than either Hop or Suckling Clover, and often grows to a height of 2 to 3 feet, while the latter very seldom exceed a few inches. Instead of the flowers being grouped in a typical clover flower-head, they are distributed along a good length of the upper branches of the stem, their colour being yellow in the case of Melilotus and white in the case of the allied plant Bokhara Clover. The pods, nearing ripening, are small, round, green, and one-seeded. The tolerance of Melilotus for salty conditions is fairly high, but its possible value on this account is offset by the strong flavour it imparts to dairy produce.

Hop and Suckling Clovers.

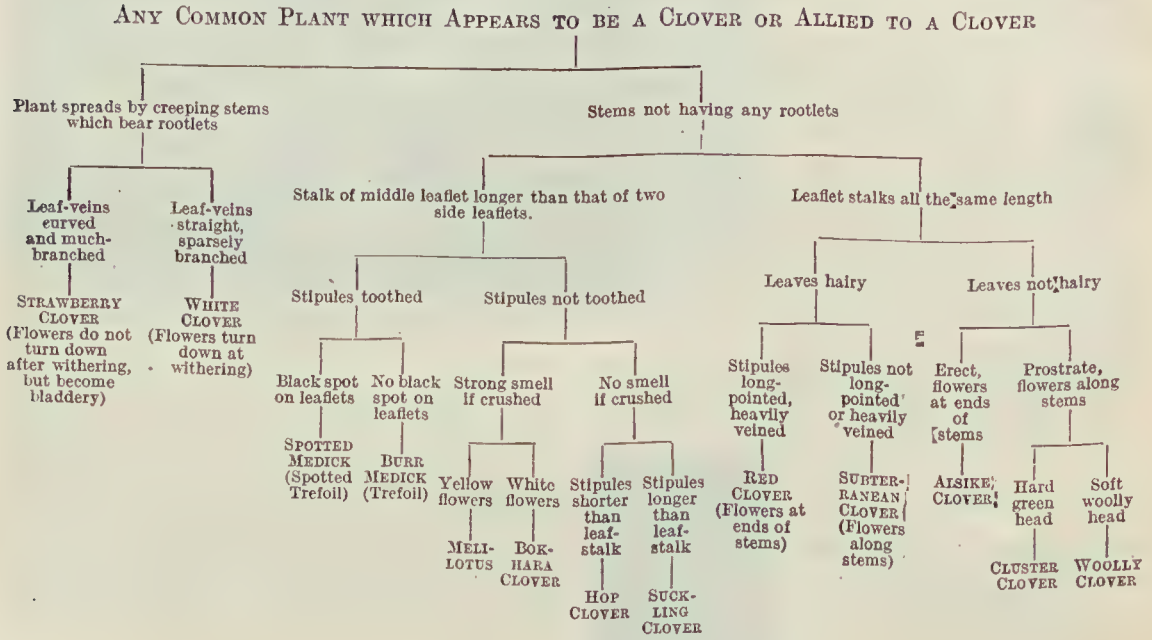
Before flowering, Hop and Suckling Clovers are difficult to separate except by comparing the length of the stipule with the length of the leaf-stalk to which it is attached. In Hop Clover the stipule is much shorter than the leafstalk, while in Suckling Clover the stipule is as long as, or longer than, the leafstalk. As they mature, both show small yellow flowerheads, the main difference being that Suckling Clover has fewer flowers in the head. As a rule, both are small annuals of very little value, since they run off to flower without forming much leaf, and after flowering the stems are hard, woody, and of low nutritive value.

In addition to the clovers touched on, there are one or two which are becoming of increasing importance, though hardly to be compared in this respect with those dealt with above. Such plants as Knotted Clover (which bears a resemblance to Subterranean in hairiness, but differs in having flowerheads much larger and of a pink colour) will probably be found useful in some situations, while Narrow-leaved Clover may be regarded as a useless weed. The long narrow shape of the leaf of the latter, together with its hairiness, erect nature, and rough heads about 2 inches long, constitute a safe guide to its identity. Drooping Clover is an annual clover somewhat resembling Cluster Clover, but the flowerheads, pink in colour, are stalked, while those of Cluster are stalkless. Instead of forming a hard ball on ripening, the Drooping Clover flowers are turned back in the head after the fashion of White and Alsike Clovers, and remain quite soft.

In order to assist those interested, the chart shown below has been prepared. This shows the relationship of the various clovers touched on, and with its aid it should be possible to identify any common clover species in comparatively few minutes. To use the chart follow the arrows down, picking out the particular feature which is present on the specimen. It will be seen that there is always a choice between two definite and easily visible characters.

Acknowledgment is made to Miss Y. Aitken for the line drawings shown.

KEY TO IDENTIFICATION OF CLOVERS.


Any Common Plant which Appears to be a Clover or Allied to a Clover
Plant spreads by creeping stems which bear rootlets
Stems not having any rootlets
Leaf-veins curved and much-branched
Leaf-veins straight, sparsely branched
Strawberry Clover (Flowers do not turn down after withering, but become bladdery)
White Clover (Flowers turn down at withering)
Stalk of middle leaflet longer than that of two side leaflets.
Leaflet stalks all the same length
Stipules toothed
Stipules not toothed
Leaves hairy
Leaves not hairy
Black spot on leaflets
No black spot on leaflets
Strong smell if crushed
No smell if crushed
Stipules long-pointed, heavily veined
Stipules not long-pointed or heavily veined
Erect, flowers at ends of stems
Prostrate, flowers along stems
Spotted Medick (Spotted Trefoil)
Burr Medick (Trefoil)
Yellow flowers
White flowers
Stipules shorter than leaf-stalk
Stipules longer than leaf-stalk
Red Clover (Flowers at ends of stems)
Subterranean Clover (Flowers along stems)
Alsike Clover
Hard green head
Soft woolly head
Meli-lotus
Bokhara Clover
Hop Clover
Suckling Clover
Cluster Clover
Woolly Clover

The Control of Thrips

Results of Field Tests

By K. M. Ward, B.Agr.Sc., Assistant Entomologist.

THE insect to which has been attributed the widespread light cropping of fruit in the 1931-1932 season is *Thrips imaginis*, Bagnall (Fig. 1.). This species is indigenous to Australia, and we do not find reference to damage done by it in any other part of the world. *Thrips tabaci*, Lind., a very closely related introduced species, formerly considered to be identified with *T. imaginis*, is of world-wide distribution, but it is said not to occur in Victoria.

The first record of the appearance of thrips in vast numbers in Victoria was made by Mr. C. French, sen., in his *Destructive Insects of Victoria*. In the spring of 1909 thrips infested the flowers of cape weed (*Cryptostemma calendulaceum*), but there is no record of their damaging fruit blossoms; potato crops only appeared to suffer, the haulms being destroyed. Further outbreaks of magnitude occurred in the seasons 1913-14, 1914-15, 1922-23, 1926-27, 1931-32, each one apparently being more serious than the last, and on each occasion fruit blossoms were attacked. In 1926 extensive work to find a means of control of the pest was begun, but although 60 or more different sprays were tested none of the results was very promising. The work showed that the standard sprays and others were of little value in a heavy infestation, and, further, it emphasized the seriousness of the problem.

The recent outbreak is considered to have been the most serious yet. It extended approximately from the first week of October to the first week of December, and almost all plants which flowered during that period were attacked, even the flowers of various grasses. Further, the insects were found to be numerous, and apparently breeding in the growing parts of many plants ranging from bracken fern to peach trees. The numbers of the insects were so vast that city offices and trams were invaded.

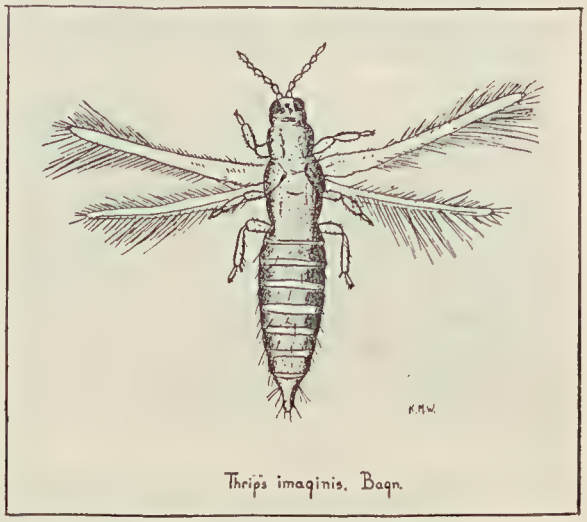


Fig. 1.—A Thrips—greatly enlarged.

The Problem of Control.

The appearance of thrips in orchards, &c., is sudden. Invasion takes place some little time before the blossoms commence to open, and the damage is done, in most cases, before the blooms have burst. Fruit is prevented from setting by the damage the insect does to the vital parts of the flower—the pistil and stamens, these organs being destroyed before pollination and fertilization can take place. It is practically impossible to reach the insects by means of sprays in the unopened blossoms.

Other factors which render control of the insect very difficult are (i) a large number of generations occur in one season; (ii) breeding and feeding take place on many host plants, and invasion from surrounding bush, &c., into orchards is easy; (iii) the sporadic occurrence of the insect limits field work to those seasons in which a plague occurs; and (iv) results obtained in one outbreak cannot be confirmed until the next.

Habits and Life History.

Thrips imaginis is present in flowers every year, but it does severe damage only when present in large numbers. In a blossom, each insect makes many gashes or cuts in the surface of the various organs, and in each cut the insect inserts its stylets, and the contents are sucked from the underlying cells. This results in the death of these cells followed by the withering and death of the entire organ attacked. Thus the injury appears to be largely mechanical. Damage is done to other parts of the flower also, e.g., the petals, resulting in their death when thrips are numerous. To a less extent leaves also are attacked.

By means of a saw-like ovipositor the insect embeds eggs singly within slits in soft tissues of the flower. The young larvae on hatching feed actively, but full-fed larvae leave the plant and enter the soil to pupate. The pupa is almost inert and does not feed. The adult insect emerges from the soil and flies to a host plant. Under optimum conditions, the life cycle occupies about 21 days.

From observations in other years (e.g., J. Farrell, in this *Journal*, March, 1919), it seems that the appearance of thrips in vast numbers is influenced greatly by conditions of high temperature and low rainfall in the early part of the season—September and October. Probably a winter with temperatures above normal would enable a larger proportion of the hibernating adults to survive till spring.

Experimental Work in Victoria.

Further to the work of 1926 previously mentioned, experiments were carried out during the present season at Kalorama to test the efficacy of insecticidal dusts in decreasing the thrips population in raspberry flowers sufficiently long to allow the blossoms to set.

Method.—A uniform patch of Northumberland Filbasket raspberry canes three and a half years old was divided into eighteen plots, each containing sixteen canes. The site was particularly subject to infestation, being adjacent to native vegetation, other raspberry canes, and a luxuriant growth of Yorkshire fog grass in which thrips were present in dense numbers. The treatments consisted of—

A. Plants dusted three times per week.
B. Plants dusted twice a week.
C. Controls—untreated plots.

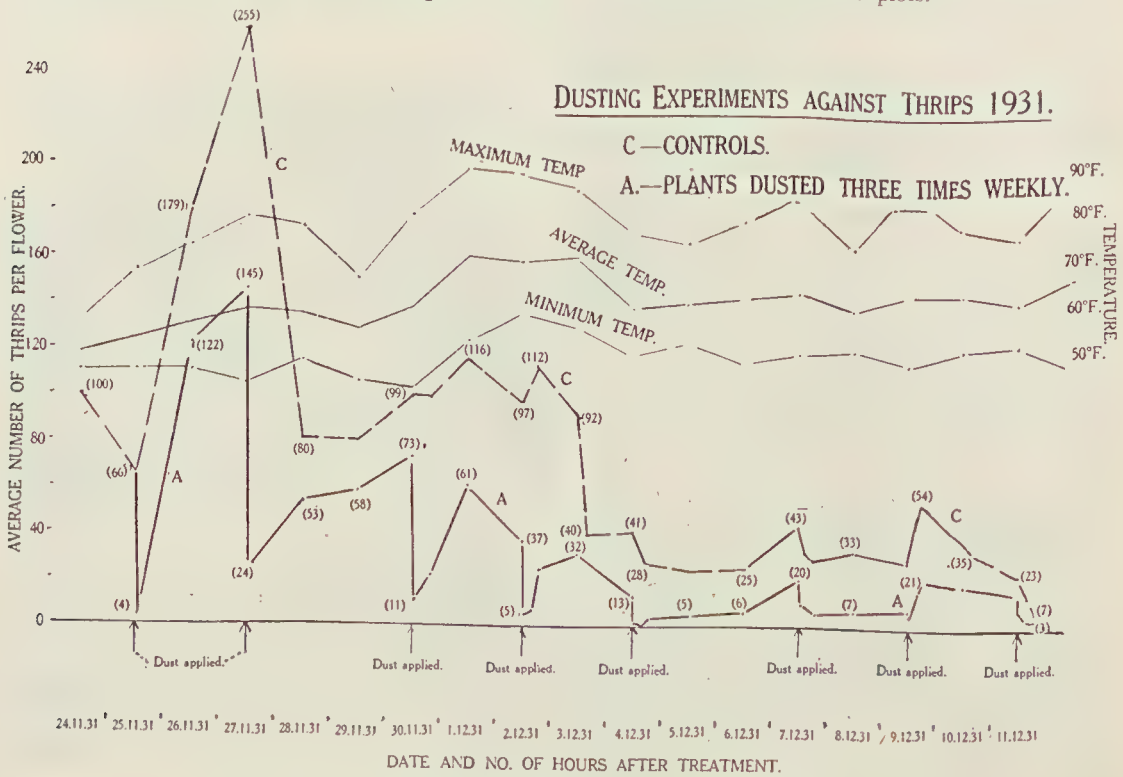


Fig. 2.—Rate of re-infestation after dusting three times a week.

Each treatment and the controls were replicated six times. Dust was applied by means of an intermittent knapsack blower. After dusting the rate of re-infestation of the blossoms by thrips was ascertained by making counts of the thrips in flowers gathered at random from the treated plots. Each flower was collected in a glass phial, the insects brushed out on to a piece of white paper and the live ones counted. Counts were made immediately before dusting at 1 hour, 3 hours, 6 hours, 24 hours after dusting, and every subsequent 24 hours until the next treatment. At each count collections were made also from the control plots. The treatments were carried on from the commencement of the flowering period until the thrips had naturally decreased to harmless numbers in the controls.

The dust used ("Nictar") was a proprietary preparation consisting mainly of nicotine sulphate in a dolomitic lime base. The rate of application was 1¾ lb. of dust to 100 plants. Before the harvest the percentage set of fruit on the treated and untreated plots was determined from counts of fruits on the canes.

Results.—The results on the rate of reinfestation are shown graphically in Figs. 2 and 3. The graph shows the fluctuations in the number of thrips in the blossoms in the treated and untreated plots throughout the period of the experiments. It is seen that on dusting there is an immediate decrease of about 90 per cent. in the number of thrips per flower. The majority of the insects fall to the ground and eventually die. They are rendered inactive at once, but death does not occur for from 30 minutes to 4 hours later. Apparently dead to the naked eye, the microscope reveals a twitching of the legs and antennae as slow paralysis takes place. In no case was a thrips observed to recover, even after a very light dose of dust.

Thrips soon begin to re-infest the blossoms, and at a rate which, at the end of 24 hours, brings the numbers back to 80 to 85 per cent. of those present before treatment. An exception to this occurred on 25th November after the first application of dust. In spite of the dust, the numbers rose very rapidly, and in 24 hours there were twice as many as there were before treatment. This rise corresponded with a great rise in the controls. In these plots on 27th November the lowest number of thrips per flower was 184, and the

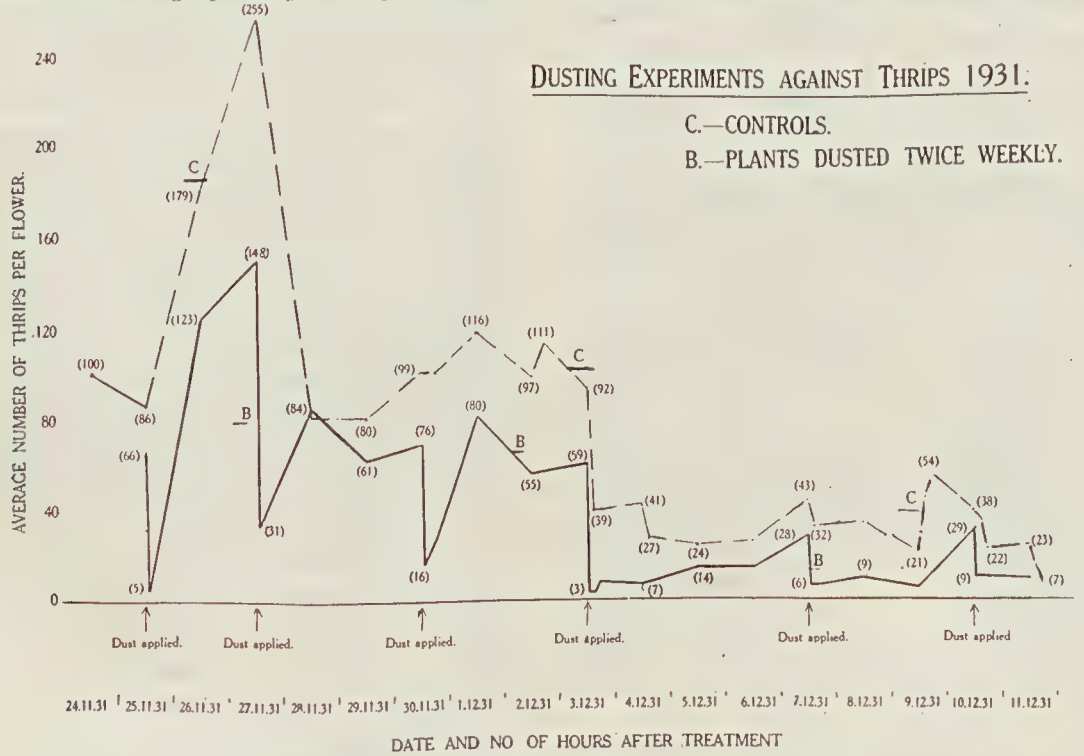


Fig. 3.—Rate of re-infestation after dusting twice a week.

highest 346. This great increase probably coincided with the emergence of another brood of the insect. The sudden decrease on the 28th seemed to be partly due to dust being blown across the control plots during treatment of A plots.

It is considered that normal conditions of the plague prevailed until 3rd December, when in the course of a few hours, and partly due to a cold wind, the numbers fell very rapidly. The dusting was continued for another week, and from the results it appears that the dusts would be more effective in a lighter infestation.

The results from the plots dusted twice weekly are, in general, the same as those from the plots treated three times weekly. The difference in the set of fruit on the two was quite insignificant. In the B plots the rate of re-infestation was even more rapid, and the numbers rose higher between treatments.

The set of fruit on the different plots is shown below. As it is not known exactly what percentage of the blossoms set in a normal season, the figures show the percentage which set out of the total blossoms formed.

Plots.	Marketable Fruit.	Percentage of the Marketable Malformed.	Nonset.
A.	75·2	6·8	24·8
B.	73·1	9·2	26·9
C.	67·0	14·9	33·0

The following figures are averages of estimates as to what percentage of a normal crop had set in different properties in the 1931-32 season in the Mount Dandenong district:—

Variety.	Percentage of a Normal Crop.	Approximate Flowering Period.
Raspberries—		
N. Filbasket ..	70	20th Nov.—24th Dec.
Smith's Seedling ..	85	21st Nov.—26th Dec.
Child's Selected ..	78	15th Nov.—18th Dec.
Red Antwerp ..	25	10th Nov.—14th Dec.
Loganberries—		
Black Logan ..	0	October to November
Red Logan ..	3	October to November
Strawberries—		
Melba	1-20	10th Oct.—20th Nov.
Wilson's Pride ..	3	8th Oct.—20th Nov.
Gooseberries ..	Apparently little affected by Thrips.	Oct.
Currants		

It is evident that the best crops set on those plants whose flowering period occurred largely outside the period of the thrips plague. Although the gooseberries and currants flowered during the plague they set good crops. This is explained by the fact that these fruits belong to a different botanical family (*Saxifrageae*), and have a different type of flower from the other fruits mentioned. The latter belong to the family *Rosaceae*.

In connexion with the strawberries, the following interesting facts were noted:—

1. Where a small plot in a bed of strawberries was dusted by the Department early in the flowering period, and later followed by further dustings, 43 per cent. of the blossoms set into fruit. The rest of the bed was also dusted, but the early application was omitted. Here, only 2 to 6 per cent. of the flowers set.

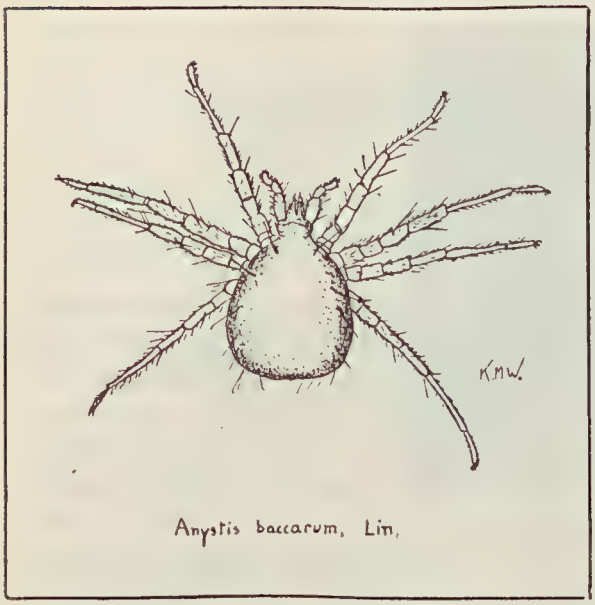
2. In a small patch at Olinda, which received similar treatment, an 80 per cent. strawberry crop (Melbas) and a 100 per cent. raspberry crop were obtained. Unfortunately, no check plot was left on this property, but a neighbouring patch of undusted strawberries showed only a 6 per cent. crop.

3. In a bed of young Wilson's Pride strawberries all the blossoms of the first crop were destroyed, but later on the plants threw out another set of blossoms which developed into a fair crop—30 per cent. normal. This intermediate crop is not usual in a normal season.

Other dusts tested were "Tendust," "N40" (both nicotine preparations), nicotine and sulphur, and a pyrethrum dust. Several sprays were to be tested at the same time, but were abandoned, as the poor penetration of the blossoms at the spray pump pressure available, and their poor repellent powers were unsatisfactory. There was little difference between the results obtained with the above dusts; the set of fruit on these plots was as good as that on the "Nictar"-dusted plots. Although very efficient destroyers of thrips, they did not appear to have sufficient repellent powers to give promise of satisfactory control.

Predators on Thrips.

During the course of the work several natural enemies of *Thrips imaginis* were observed. Most active was a mite, *Anystis baccarum*, Lin. (Fig. 4). This is a pale red animal about 1.3 mm. in length, capable of very rapid movement. By means of large, pointed mandibles projecting from the front of the head a thrips is seized, usually by the



A natural enemy of thrips.

abdomen, its body is punctured and the fluids sucked out. As soon as one victim is killed another is seized. In a few hours a number of the mites destroyed an average of as many as 30 thrips each. During the experiments they increased in numbers until as many as 90 could be shaken from each plant in the control plots, and 30 from the treated plants. They were also on strawberry plants, but a limited search failed to reveal them on native vegetation. This mite belongs to a group which is predaceous on many small insects and acari. It would probably be too general a predator to be of much use in biological control. Its identification was kindly supplied by Mr. H. Womersly (Western Australia).

Other active predators on thrips were larvae of a lacewing (*Chrysopa* sp.) and of the common ladybird. A possible true parasite in the form of two very minute pupae was collected from a thrips infested blossom. Adults did not emerge, so identification was impossible. It is probable that a true thrips parasite exists here, and a little further intensive work would reveal it.

Conclusion.

A number of factors detracted from the conclusiveness of the results. Firstly, the decrease in the numbers of thrips after 3rd December both reduced the period of observations and permitted a fairly high percentage of the blossoms to set; thus the difference between the set of fruit in the treated and untreated plots is small. Further, the number of thrips in the control plots was probably reduced both by the drifting of dust across them during the treatment of A and B plots and the number of predatory mites present.

Nevertheless, although the degree of infestation was considerably reduced, it appears that the rate of infestation was too high to give promise of satisfactory control by means of the type of dust used. The dust was very efficient in penetrating the blossoms and killing all thrips present, but, after a few hours, re-infesting insects were neither killed nor repelled. It is not known whether the presence of the dust acted as a mechanical hindrance to the insect. From the set of fruit on isolated patches of strawberries, it would appear that the dust had some effect in reducing the activities of the insect in the flowers.

It is probable that thrips are not entirely responsible for the non-setting of fruit in the present season. Tests carried out this season by Mr. A. G. Strickland, Horticultural Research Officer, on the viability of apple pollen showed that this factor varied considerably, and that, in general, the pollen was much less viable than would be expected in a normal season. Further, he tested the pollen in late flowers of the chief berry fruits with similar results. Thus, in the case of the black loganberry, which set no fruit this season, less than 1 per cent. of the pollen would germinate. Smith's seedling, with the heaviest crop of fruit, showed the highest percentage germination of pollen (71 per cent.). All the flowers from which these results were obtained were collected at the same time, and were apparently perfect. Again, in some apple districts in which thrips were in plague numbers, good crops were obtained.

Winter Growth of Pastures

Methods of Improvement

By R. L. Twentyman, B.Agr.Sc., Agrostologist.

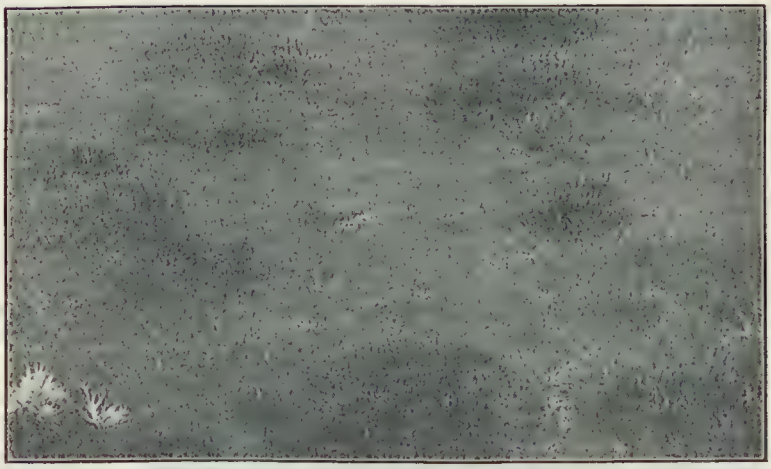
THE problem of increasing production from Victorian pastures has aroused considerable interest in recent years. To a large extent this revival of interest in the supply of the natural diet of the grazing animals has been due to comparatively recent developments and discoveries in pasture investigation work. Another important factor is that while the prices realized for the products of most agricultural and pastoral industries have fallen to a very low level, local prices for dairy products, though lower than for many years, have been maintained at a more reasonable figure.

Generally Victorian pastures, especially in the higher rainfall districts, have been considerably improved during the past ten or fifteen years, mainly by means of top-dressing, but also by the introduction of the better species of grasses and clovers. Hard and continued grazing over many years had resulted in a steady removal of plant food from the soil, and this depletion, particularly of phosphates, had reached such a stage as to prevent the full development of the pasture plants. Further, the more productive types of grasses, being adapted to soils of fairly high fertility, were crowded out as they were unable to compete against the incoming weeds and rubbish which were capable of thriving on these exhausted soils. In most cases the remedy for this trouble was found to be very simple. The application to the pasture of a top-dressing of the required plant food in the form of superphosphate has been sufficient to double and even treble the growth of grass.

Although soil fertility and the nature of the species of grasses and clovers may have a most important bearing on the productivity of a pasture, a still more important force controlling pasture growth is that due to climate. As is well known, the grazing value of pasture land varies greatly from season to season, and, in fact, from week to week. Such fluctuations in growth occur in pastures throughout the world, and it is largely their nature and extent that determine the particular type of animal husbandry practised. In Victoria these seasonal variations in growth operate to a most embarrassing degree. Paddocks which, for three months during the spring, may be capable of carrying a milking cow to the acre are found in the winter to grow only sufficient grass to feed one cow to 15 acres. Similar variations, but to a lesser degree, occur throughout the rest of the year.

If this period of slow growth lasted for a month or six weeks only it would be quite a simple matter to supply the stock with sufficient stored fodder to carry them over that lean period. Unfortunately, in a large portion of Victoria, this lean period is more prolonged, usually commencing early in May and lasting till the end of August. From then on, there is generally an abundance of green feed until December, when hot weather causes the grass to dry off and mature. The excess unconsumed growth produced during the spring usually is sufficient to supply all the required dry feed during the summer, and keeps the stock going until the autumn. However, from then on, the supply of natural feed is dependent on the autumn rains which normally produce only sufficient grass for the immediate food requirements of the stock and provide no surplus growth for consumption during the winter. Thus the winter period is entered upon with the pastures eaten close and the growth of grass almost at a stand-still. This state of affairs recurs with unfailing regularity each year, and the provident dairyman conserves sufficient fodder during the spring to carry his stock over the winter. Others less wise attempt to evade the influence of this lean period by drying off the cows before the winter and having them come in to milk again in the early spring. Unfortunately, the fact that the cows are not milking during this period is sufficient excuse for some farmers to greatly reduce or stop hand-feeding altogether. As the cows are unable to obtain sufficient feed from the paddocks they rapidly lose condition,

and when they do come back into milk are not in a fit state to withstand the heavy strain of a long period of milk production. In such cases the cow, instead of being able to convert the abundant spring growth of grass into a heavy flow of milk, spends the early part of the spring recovering from the ill-treatment of the winter. Cows liberally fed during this non-production period are given the opportunity of restoring their vigour and constitution, and, coming back into milk in a healthy condition, give higher yields, and are more resistant to disease.



Rank patches due to unspread droppings.

The provision of an adequate food supply for the stock during the winter necessitates either hand-feeding with bought or stored fodders or else an increase in the amount of natural feed growing on the farm. An alternative to this latter means is the practice of putting the stock out on agistment areas during the winter months. In the past this practice has been extensively adopted in portions of the State that experience a long severe winter. Where good agistment areas are available the method is a sound one, but, unfortunately, it is only too common an experience to find the stock coming back from such areas in a poorer condition than when they left the farm.

It is with this question, of increasing the growth of winter feed on the pastures, that the writer proposes to deal. The primary reason for the shortage of growth on pastures during the winter is that the temperature of both the air and soil is too low for normal plant growth. Dairy-farmers and graziers know that frosts or spells of cold weather in late autumn quickly check the growth of grass. Little or nothing can be done to reduce this effect of the severity of the climate. In exposed areas use may be made of wind breaks to provide some shelter for the paddocks from cold winds, but although they may break the effect of the wind somewhat, it is usual to find that their roots reach out for a considerable distance on either side and adversely affect the growth of grass near them in the spring Probably the most useful function of such breaks is to serve as a shelter for the stock rather than for the pasture.

Inasmuch as we cannot alter or modify the weather conditions of a locality, any attempts at increasing growth during this winter period must be directed along the lines either of introducing plants that can grow better during the cold weather, of improving soil conditions so that the existing plants are encouraged to make increased growth or else by so regulating the grazing of the pastures that the grass is spelled and allowed to recover between the periods of grazing.

As a means of increasing soil fertility, top-dressing with superphosphate is immediately suggested. For some years now this practice has been widely adopted throughout southern Victoria, and the improvements effected by it are very generally recognized. Not only is the bulk of the fodder increased and its quality improved, but the condition and health of the stock also are greatly benefited. The value of early autumn top-dressing is greater than is often realized. Early top-dressing with a quick-acting phosphatic manure such as superphosphate increases the autumn and early winter growth, and so increases the supply of winter feed. Especially is this so in the case of annual pastures where the growth of the young germinating seedlings is greatly stimulated by top-dressing. In this way subterranean clover, the native trefoils, and the annual varieties of grass which usually contribute so largely to the feed on winter pastures may be encouraged to make

Harrowing spreads droppings and prevents rank patches.

a greatly increased growth. In the case of good pastures, but especially on dairying land, it will be advisable before top-dressing to thoroughly harrow the ground to spread the animal droppings as soon as they have been sufficiently softened by the rain. On heavy producing pastures any old rank or dried growth should be either mown or grazed off before harrowing.

The fertilizing value of these animal droppings when harrowed and distributed over the paddock is quite large. It has been calculated by a New Zealand authority that in the course of a year the amount of fertilizing material contained in the droppings of a herd of 30 cows would be equivalent to 9 tons of sulphate of ammonia, 2¼ tons of superphosphate, and 4½ tons of sulphate of potash. At current prices these quantities of fertilizer would cost £204. If this material is not spread, but is left in small heaps, it causes the soil immediately around it to become over-rich in plant food. This results in the formation throughout the paddock of a large number of coarse rank patches of growth which the stock will not eat. In this way, material, which is potentially a large supply of fertilizer, is not only being wasted, but is actually doing the pasture harm rather than good.

Recently much has been claimed for the benefit resulting from heavy and frequent harrowings. This practice as applied to the rotational grazing system of grass-land management originated in Europe, and was extensively adopted in New Zealand, where it was of considerable benefit to those pastures which tended to form a matted sward and become sod-bound. As a means of spreading dung, harrowing is extremely useful, but in this State there are only very few types of pasture that would benefit by the actual cutting and penetration of the soil by the harrows. These cutting and penetrating harrows require a heavy draught to work them through the ground, and involve the use of more horse-power than a dairy-farmer usually has at his disposal. However, in view of the real benefits obtained from spreading the dung, it would be most unfortunate if this operation were omitted, because it might be thought that soil cultivation and not dung spreading was the primary purpose of harrowing.

Before leaving the question of the improvement of soil fertility, mention might be made of the part played by lime. In the past this material has been used on pastures with the idea that it cannot do any harm, and it ought to do some good. Usually its effect on pastures is not very marked, and it is only in exceptional cases of extreme lime deficiency that any substantial increase in growth is obtained. Its effects are most noticeable during the winter time, and the difference between treated and untreated pasture is occasionally quite marked at this period. In the pasture top-dressing experiments conducted by this Department throughout Victoria lime applied on its own has seldom shown any improvement, but where it has been used together with superphosphate it usually has given considerably better results than super. alone. This is especially so in the wetter parts of the State, and it is in those districts that the use of lime seems to have distinct possibilities for encouraging extra winter growth on pastures.

The second means by which the condition of the soil may be made more favorable for plant growth during the winter is by draining wet and water-logged areas. Artificial drainage involving a system of underground agricultural drains is a most expensive undertaking, and

the cost could be justified only in the case of first class pasture land. Generally for pasture purposes any money available for drainage schemes should be expended on the wet areas that can be most easily improved. In some cases considerable improvement may result by constructing a short drain into some existing outlet. In other cases existing drains may only need cleaning out or deepening to make them really effective once more. Again, it may be possible to intercept surface water coming into a field from higher ground by means of a plough furrow, and so run this water direct into an outlet.

In some cases, in considering the possible advantages and the cost involved in draining areas that may be temporarily waterlogged in winter, it may be advisable to bear in mind the possibility of the effect of drainage on such areas during the summer. Quite often it is found that these areas provide a valuable green bite in summer when the rest of the pasture is dried off, and unless the drainage can be done cheaply and effectively it is possible that the small improvement in winter growth may not justify the expense.

Winter-growing Species.

Let us now consider the possibilities of making better use of the existing soil conditions by the introduction of plants capable of making improved growth during the winter. It is well known that the grasses and clovers vary greatly in their periods of active growth. Such plants as paspalum couch grass, red clover, and strawberry clover make most of their growth during the late spring and summer. On the other hand, Wimmera and Italian rye-grass, prairie and barley grass, subterranean clover and the native trefoils are all capable of making very considerable winter growth. There is at present, however, a rather serious drawback to the improvement of pasture growth along these lines. It can be taken as a general rule, that the plants which make good winter growth mature and dry off early in the spring. It may happen then that the small extra quantity of winter feed is obtained at the cost of a considerable decrease in growth during the spring. For this reason it is desirable that a pasture generally should consist of a mixture of species capable of making useful growth all the year round, as far as is permitted by the supply of soil moisture. In this way it is possible that when one species of the pasture is approaching maturity other species may be just starting their most active growth. So the pasture as a whole produces a continuous succession of feed. One must bear in mind the fact that with the existing pasture species, ability to yield well in the winter will usually be reflected in a reduced yield during the spring flush of growth, and it is at this time of the year that fodder should be conserved for use during the winter. Increasing the growth of winter pastures by means of top-dressing, harrowing, drainage, or by the careful blending of suitable grass and clover species is all very well and quite desirable, but if it comes to a matter of increasing winter growth at the expense of the spring flush of feed then the position is very different. For, in any case, no matter what substantial increases may be made in winter growth the main food requirement of stock during this cold weather is dry fodder. This should be grown and conserved during the spring flush, for it is much simpler to conserve the large bulk of surplus natural growth at this time of the year than to force an extra supply of feed at a time when weather conditions are opposed to its growth. At the present time much work is being done on the selection and development of strains of grasses and clovers capable of making better and increased growth over a wide range of soil and climatic conditions, and it is hoped that by means of these it may be possible to lengthen considerably the growing season of our pastures.

One way in which the winter-growing types of grasses may be turned to useful account is by sowing the seed of them on the lightly broken surface of recently cropped land. Very often in this state a paddock after being cultivated and cropped for hay is expected to find its way back into pasture as best it can. Eventually a pasture of a sort does develop, but for the first years after such treatment the paddock will grow mainly sorrel, weeds, and rubbish, and produce little feed. Very much better results would be obtained from land which has been cropped, if an attempt were made to re-establish *some* pasture on the stubble before the weeds have time to take possession of the land. Often this can be done quite successfully merely by cultivating the old stubble sufficiently to form a shallow mulch in which to sow the seed. Of course, such treatment cannot be expected to give as good a start to the young grass plants as would a well prepared seed-bed, but it is a practice that is both simple and cheap, and much

better than relying on volunteer rubbish to provide feed. If such stubbles were sown to a mixture of Italian and perennial ryes and white and subterranean clovers in the higher rainfall districts or to Wimmera rye and subterranean clover in the drier areas they would produce a very useful body of feed during the winter.

In districts of poorer pastures and where cultivation is largely practised, green crops such as rape, oats, or barley usually provide an abundance of green winter feed. But in the wetter districts where it is usually possible to maintain good pastures this practice is not to be advocated, as the wet condition of the land during the winter makes the feeding off very uncertain, and the quality of the feed produced is likely to be very low.

Good grass hay provides a more nutritious and suitable food for dairy stock than does oaten hay, and, except in irrigation districts, grass silage cut from the pastures early in the spring will be found to provide a much more reliable and satisfactory form of succulent feed than do the summer fodder crops. Until recently the making of silage involved considerable heavy manual work, but the introduction of labour-saving implements which can be purchased or made at a very reasonable cost has transferred most of the work to the horse, and this serious objection to conserving fodder as ensilage no longer exists.

A further means by which grass land may be encouraged to provide extra winter feed is by so arranging the grazing of the paddocks that the grass is not continuously grazed, but is allowed a period in which to recover before being grazed again. Essentially this is the principle of the intensive rotational grazing scheme of which so much has been heard in recent years. Sufficient stock should be put on a paddock to graze it out evenly in three or four days. After that time the paddock is shut up and the stock moved on to the next field. The complete scheme involves the use of a large number of very small paddocks, but from experiments conducted in this State it would seem that, provided an ordinary dairy-farm is divided into ten or twelve paddocks, it is possible to practise a modified form of rotational grazing which will give practically as high a carrying capacity, but without the high expense of the intensive rotational grazing scheme.

To summarize, it may be said that the growth of winter feed on pastures may be encouraged by top-dressing with superphosphate in early autumn, harrowing the pastures to distribute the often neglected but very valuable animal droppings, applications of lime to paddocks that show a beneficial response to trial strips, attention to drainage, the introduction of suitable winter growing types of plants into the pasture, and by so regulating the grazing as to enable the grass to recover before it is grazed again.

Attention to all these details will serve to increase materially the supply of winter green feed, but in any case it must be remembered that such feed in itself does not form a suitable ration for a dairy cow, and it will be necessary to hand-feed liberal amounts of suitable dry fodder during the winter. Such dry feed should be obtained largely by conserving the surplus growth produced in the previous spring.

Making Meadow Hay.

Tobacco Growing

VIII.—Marketing the Leaf

By W. J. B. McDonald, B.Agr.Sc., Assistant Inspector of Agriculture; and G. E. Coghlan, Tobacco Field Officer.

The first Article of this Series, which appeared in the August issue of the Journal, dealt with the soil and climatic conditions most suitable for Tobacco growing and the preparation of Seed beds. Subsequent Articles in the September, October, November, December, January and February issues describe the methods of transplanting the seedlings, the work involved in the care of crops, the construction of flue curing barns, and in the selection of seed, harvesting, and curing.

TOBACCO leaf cured in autumn normally undergoes a spring sweat or fermentation. If not sold until late September or October, this fermentation or sweat occurs while the leaf is still in the care of the grower. In a properly controlled sweat, the chemical changes taking place in the leaf greatly enhance its quality and value, but on the other hand, should warm moist weather encourage a too rapid or too complete fermentation, a condition favouring the development of mildew and rots occurs, resulting in much damage to the stored leaf. By proper management of his bulk or bales, according to the manner in which his leaf is stored, the grower can obtain the benefits accruing from this seasonal sweat without suffering any loss due to mildews or rots.

The incidence of the sweat coincides with the advent of spring weather, but progresses most rapidly when the leaf has been stored in a moist condition, and the weather is warm and muggy. During fermentation heat is generated and the quantity of ammonia liberated by the bulk somewhat increased. The degree to which these phenomena exhibit themselves is an approximate measure of the rate of fermentation, and should the rise in temperature be very rapid the grower must take steps to check the rapidity of the ferment. Should the temperature reach 80° F. the bulk should be rebuilt.

Where leaf has been baled immediately after grading, it usually contains a high percentage of moisture, as it cannot be satisfactorily handled on the benches in a dry condition. It will be easily seen that where this practice has been followed, the nature of the sweat may necessitate the breaking of the bale to prevent damage from over fermentation. The maturing of the leaf can be better controlled by re-bulking after grading, and baling just prior to marketing.

Marketing.

The only phase of tobacco-growing which has shown no improvement during the last decade is the actual marketing of the crop. The procedure in vogue at the beginning of the century is still followed, with results no more satisfactory now than they were then. Until recent years there has been little incentive to any change as the production of tobacco had been localized in well-defined areas, and only one buyer was a serious bidder for the crop. Recently, however, several large buyers have come into the market for Australian leaf, and it would seem that the time is ripe for the introduction of a sounder and more convenient system of selling.

The existing selling arrangements are that the buyer's representative visits each farm, usually during September and October and there inspects the various lines submitted, the number of bales closely examined depending on the size of the crop and the reputation of the grower. A price is offered, and if this is acceptable to the farmer the sale is finalized on the spot, the grower agreeing to deliver his crop by a certain date. The sale of the leaf usually is effected on the basis of a certain definite moisture content.

The buyer reserves to himself the right to reject any leaf not conforming to the general standard of the grade, or leaf which has developed mildew subsequent to the period of

inspection. Payment for leaf is made on the factory weight, which is obtained in the presence of an officer of the Customs and Excise Department, and reduced to the previously declared moisture content.

In districts where the quantity of leaf does not warrant the expense of sending a buyer's representative to inspect it, the only procedure possible is for the grower to submit a genuine sample of his various grades to as many buyers as he deems fit, advising them of the available quantity of each grade. Should the buyer be interested in the sample submitted, he will offer a price for the crop.

The disadvantages of this selling method are fairly obvious. Unless the grower should be fortunate enough to meet several buyers at the same period, there is little real competition for his product. It further depends entirely on the generosity of the buyer whether the prices paid to different growers for similar lines are the same as, where individual bargaining takes place, the ultimate price reached is governed largely by the business acumen of the seller, and the presence or absence of embarrassing financial obligations.

A further serious disability is due to the fact that there is no general meeting of growers such as is afforded annually on the floor of an auction room. The interchange of ideas and facilities afforded for comparing the products and baling methods of different growers are a liberal education to all those engaged in the industry. Such a common meeting ground would help to establish eventually a uniform grade, whereas, at the moment, no two growers have the same conception as to what constitutes a particular grade. The excellent "get up" of the Australian wool clip has been achieved only through the collaboration of the growers, and there is no valid reason why the tobacco-grower cannot emulate the pastoralist in this respect.

Marketing methods in other countries have evolved largely from the system of individual barter such as is practised in Australia to-day. Selling methods adopted in America, South Africa, and Canada, countries constituting our most serious trade rivals, are, briefly, as follow:—

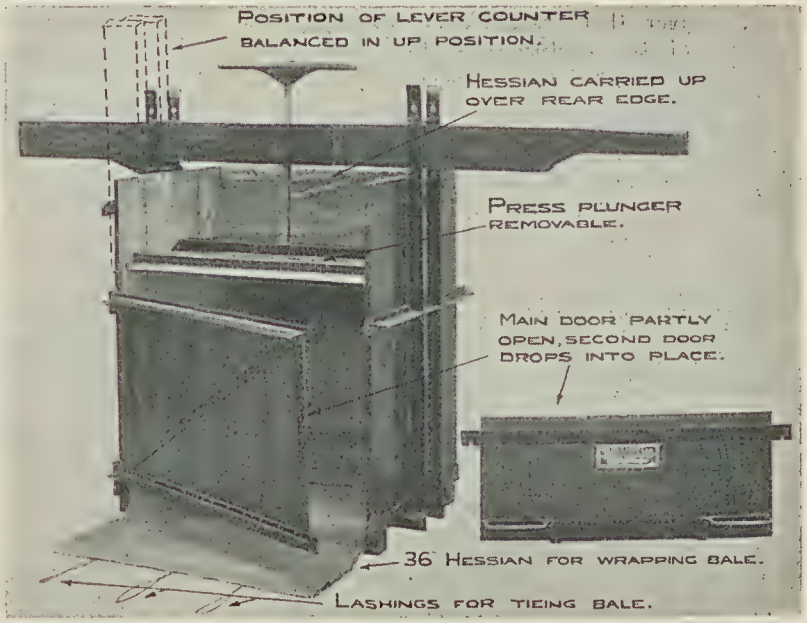
The commonest form of auction in America is known as the loose leaf auction. With the exception of those districts producing dark leaf, where some barn-buying is still practised, this method became general about 1905. Under this system of selling the grower delivers

[*Argus* Photo.

The first Auction Sale of Tobacco Leaf in Victoria at Dalgety and Co's warehouse, Melbourne.

his leaf at warehouses with ample floor space and abundant overhead lighting. The leaf is graded by the grower, and when delivered at the warehouse is placed on tray-like baskets, each grade being kept separate and the identity of each lot being maintained. The baskets are then arranged in rows, leaving sufficient space for the auctioneer and buyers to pass between them.

During the sale the auctioneer is preceded on one side of the row by a representative of the warehouse, who indicates a starting bid for each basket of leaf. The buyers on the other side of the row inspect the contents of each basket and bid accordingly. The selling is very rapid, from 200 to 300 baskets being sold in one hour.


POSITION OF LEVER COUNTER BALANCED IN UP POSITION.
HESSIAN CARRIED UP OVER REAR EDGE.
PRESS PLUNGER REMOVABLE.
MAIN DOOR PARTLY OPEN, SECOND DOOR DROPS INTO PLACE.
36 HESSIAN FOR WRAPPING BALE.
LASHINGS FOR TIEING BALE.

A Convenient Tobacco Press.

The advantages of this method are as follow:—

(1) The conditions in the warehouses are such as to best establish the grade and quality of the leaf;
(2) sales are expedited;
(3) through comparison the grower can assess the value of his crop and the trend of market requirements;
(4) the buyer can discriminate in his purchases; and
(5) there are always several buyers present, which makes for competition and assures a demand for all types of leaf.

The disadvantages are—

(1) The grower cannot very well bargain with the buyer;
(2) the rapidity of selling calls for a lot of snap judgment on the part of the seller as to the wisdom or otherwise of accepting the bid; and
(3) difficulty of procuring floor space at the height of the season.

In 1921-22, co-operative selling was introduced in many American districts. Growers became members of central organizations signing binding contracts to deliver to the association all the tobacco produced by them for a period of years. These contracts held for a period of five years, but unless a definite percentage of total growers became parties to the contract the association did not come into being. The number of members required by the association varied from 50 per cent. to 75 per cent. of the district growers.

A yearly pool was established, and the price received by the grower for a particular grade of tobacco was based on the average price at which all the tobacco of that grade from the year's crop was sold. A specified advance according to grade was paid on delivery, and additional payments were made from time to time as sales were effected.

It is significant that at the expiration of the five years period many of these associations lapsed, the growers returning to "loose leaf" selling.

In South Africa there is an element of compulsion in the co-operative selling organization. When 75 per cent. of the growers in any area, who are producing at least 75 per cent. of any agricultural product, are members of a co-operative society, then that society, in accordance with an Act of Parliament (The Co-operative Societies Act) can move the Government to order that all producers in that area whether members or not

must deliver their crop to the society. A number of the leading co-operative societies of tobacco-growers have received these compulsory powers.

These co-operative societies, with others, are associated in one central body known as the Co-operative Tobacco Company, and this company regulates the price at which leaf may be sold to local manufacturers for home markets, and controls the selling of the whole of the surplus crop available for export. This method of handling the crop has brought about a practice of centralized selling, combined with the co-operative practice of giving the farmer, at the time of delivery of his crop, an advance based on its anticipated market value.

This practice obtained good prices for growers in the seasons 1925-6 and 1926-7, but in 1928 South African stocks were in excess of demand both at home and abroad, and consequently slumped in price.

In the early history of Canadian production leaf was sold through co-operative societies, but since 1925 the increase in the number of growers has been very extensive, and most of these societies have degenerated into ordinary trading organizations, buying on ordinary packing house terms. This system seems closely allied to the American style of auction.

Tobacco Press.

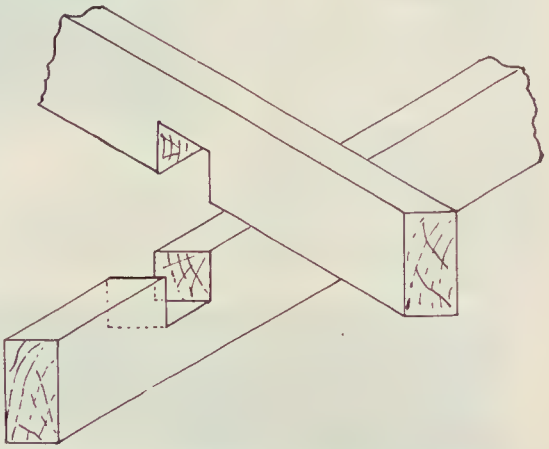
A tobacco press, which is necessary for the satisfactory baling of leaf, is essentially a bottomless box with collapsible sides and with a loose-fitting lid capable of sliding up and down within the box when the sides are wedged in position. The inside dimensions of the press should be 3 ft. x 2 ft. with sides 3 feet in height. Each wall is made of 1-in. boards nailed or screwed top and bottom to cross-pieces 4 in. x 2 in., which should project 8 inches beyond each side of the wall. The ends of the boards should be flush with the edge of the cross-pieces. Each of these pieces should be halved to a depth of 2 inches. The cuts should be 3 inches wide, and the outside edge of the halves should commence 4 inches from the ends of each cross-piece.

The halves should be cut so that the walls of the box lock together. The press is held rigid by driving wedges between the end of the mortice and the sides of the cross-pieces.

Timber required.—For walls—20 pieces, 6 in. x 1 in. x 3 ft.

For cross-pieces—4 pieces, 4 in. x 2 in. x 4 ft. 6 in. 4 pieces, 4 in. x 2 in. x 3 ft. 6 in.

The lid which transmits the pressure applied in baling should be of heavier material, 1½-inch boards being suggested for this purpose, with 3 in. x 2 in. cross-pieces. The position of the cross-pieces will vary with the means adopted of applying pressure. Where this is effected by means of a jack a cross-piece should be fitted in the centre of the lid so that the foot of the jack will rest on it. This will necessitate further pieces at either end. Where the pressure is applied by means of a long lever weighted at the end two cross-pieces placed 1 foot from either end of the lid are sufficient to carry it satisfactorily. The lid should be of such a size that it fits easily into the box.



Method of halving cross-pieces carrying side of press.

Pressing must be done on some suitable staging which will give a flat surface to the bottom of the bale.

Where the pressure is applied by means of a long pole, a stout post (12 inches diameter) is sunk in the ground to a depth of 3 feet close to the staging. This post is morticed at a point 3 inches to 4 inches above the level of the sides of the press. When the press has been filled to the requisite height, the lid is fitted in position, the pole inserted in the mortice, and pressure applied. As the tobacco sinks the pole is lifted and previously prepared blocks placed on top of the lid to transmit further pressure. This procedure is continued until the bale is completely pressed. With this style of pressing a short length of chain attached to a solid foundation at a point below the end of the lever

(*Continued on page* 133)

Home Wine and Vinegar Making

Use for Surplus Grapes

By F. de Castella, Viticulturist

AT this time of year grapes are plentiful and often very cheap. Many householders have, in their gardens, more of this fruit than the family can eat, and much of it goes to waste.

Few persons realize how easy it is to convert surplus grapes into various commodities for use in the home. Grape jam, of course, immediately suggests itself; it is good and wholesome, but there are other, perhaps, less obvious purposes with which I propose to deal. These are sterilized juice, wine, and vinegar. The home-making of these is really a very simple matter, and well within the scope of any careful housewife. A bushel case of grapes will yield about 3 gallons of preserved juice or of wine, and rather more than this of vinegar, which can be made and stored without serious difficulty. Were this more widely known, relief of many a glutted grape market might result.

Sterilized grape juice may be taken first. This is a most wholesome and agreeable beverage, whether consumed alone, or better, diluted with water or soda water. Grape juice is more palatable and much more wholesome than the synthetic cordials so much in vogue. In order to preserve the juice it is merely necessary to sterilize it, by heating to a temperature sufficient to destroy the micro-organisms responsible for its change. This sterilization must be effected after bottling and corking tightly, so that subsequent infection will be prevented.

For juice purposes grapes should be barely ripe—quite the reverse of what is needed for table purposes. The juice of very ripe grapes is flat and mawkish, though it can be improved by a squeeze of lemon or a small addition of citric acid.

The grapes are crushed and the juice is immediately extracted by means of a press. It is to be regretted that small cheap presses are not readily obtainable, for without an appliance of this kind extraction of the juice is troublesome and incomplete. A simple press of the cage and lever type can be constructed by a bush carpenter. The cage may even be replaced by a new and bright kerosene tin pierced with holes and without top or bottom; or, at worst, the juice may be extracted by wringing in clean, stout hessian, previously boiled to remove dressing. This, however, is a rather wasteful method, as extraction is very incomplete.

After straining through a jelly bag, or even through hessian, the juice is heated to nearly boiling, in a preserving pan, and, while still hot, poured into a jar and immediately corked. It may thus remain for several weeks to clarify by sedimentation, after which the clear liquid is decanted or syphoned off into bottles, tightly corked, and the corks tied down with string. The bottled juice is then heated in the same way as is done when preserving fruit in bottles, but a temperature of 200 deg. F. is sufficient, provided it be maintained for an hour. Juice thus put up keeps indefinitely if stored with the bottles on their sides.

Home Wine Making.

The conversion of grapes into wine is a much easier process than most people seem to think. It is estimated that 150 million gallons of home-made wine was produced in the United States in 1930. In that country, wine cannot now be sold. The prohibition law closed the wineries, but the wine grapes now officially known as "juice grapes" may still be and are processed into wine in the home, especially by foreign residents. In order to make wine it really suffices to crush the grapes; nature does the rest. I am sometimes asked for a recipe for wine-making. There is really no need for such, since the only ingredients are sound ripe grapes, without addition of any kind. The grape is complete in itself. It contains water, sugar, acids, tartar, &c., and usually, when the fruit is just ripe, in the happiest proportions for the purpose. Not only is the juice

within the berry of suitable composition, but nature has placed on the outside, mixed with the bloom, the yeast needed for the conversion of the sugar into alcohol; in other words, of the grape juice into wine. Unlike other fermented beverages, it is not necessary to add yeast.

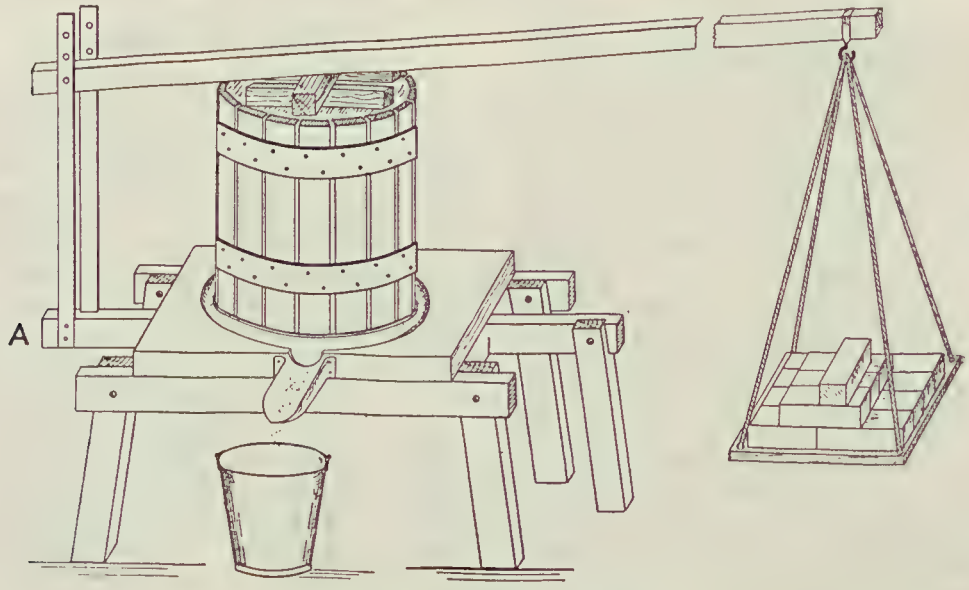
When the grapes are crushed, the yeast cells are disseminated through the juice, and in the course of a few hours fermentation starts, splitting the grape sugar into alcohol and carbon dioxide. The first remains, giving the liquid its vinous flavour; the second escapes in the form of gas, the bubbles of which give the appearance of boiling. This process continues for from four to eight days, as a rule, after which the juice has become wine. It is turbid and uninviting, but needs only time and rest to make it palatable.

To make white wine the juice is separated immediately from the skins and pips, and allowed to ferment alone. To make red wine the skins are separated only after fermentation. During this process they cede to the wine the colour and tannin that make red wine so different from white. After fermentation has ceased the wine must be stored in vessels that are kept quite full—this point is of the utmost importance. In these vessels the wine gradually becomes clear by sedimentation. Impurities, tartar crystals, dead yeast cells, &c., sink to the bottom, forming a thick sediment known as lees. Clearing is thus spontaneous; at intervals of three or four months the clean wine is racked or decanted off its lees into a clean vessel. After a few months the wine is fit for consumption and quite wholesome, though it will, of course, improve considerably on keeping.

Such is, in brief, the whole process of wine-making. Though essentially a natural process, there are several directions in which art can come to the help of nature, and by attention to the degree of maturity and, by different manipulations, we can convert our grapes into different types of wine—red or white, light or full bodied, dry or sweet.

The easiest type to make in the home is a light dry wine, either red or white, of so-called Claret or Chablis type, but really more akin to the "vine ordinaire" that constitutes the every day beverage in the different Latin countries of Europe.

This is the type of wine that was proclaimed many years ago by the great Pasteur to be the most wholesome and hygienic of human beverages. To make it, the grapes must be just ripe and not over-ripe—about 10 deg. Baumé by the hydrometer, a simple instrument, the use of which is strongly recommended. Riper grapes yield stronger wine, wholesome it is true, though not quite



A simple home-made wine press.

so desirable for every day use, a little more troublesome to make, and taking longer to mature.

With good sound grapes of this stage of ripeness, attention to two vital points will ensure success. The first is absolute cleanliness, which is just as essential in the winery and cellar as in the dairy. The second is protection from contact with air from the moment that fermentation has ceased. If a light wine be exposed to air, a secondary fermentation sets up, which converts the alcohol into acetic acid, turning the wine into vinegar. This secondary fermentation is the greatest cause of failure in the home cellar. Even if very slight the wine is rendered unsound or "pricked," to use a cellar term. Contact with air is easily prevented by keeping the vessels in which the wine is stored completely full.

The plant required is neither complicated nor costly. For fermenting and storage, kegs or jars may be used. Wooden vessels are best, as maturation is assisted by the porosity of the wood. They are, however, more difficult to clean and maintain in a thoroughly aseptic condition. Unless they receive the expert treatment familiar to trained cellarman—rapid washing, draining, and sulphuring—they are apt to contract taints which they communicate to the wine stored in them. The beginner, therefore, will find jars on the whole more satisfactory. Metal vessels such as kerosene tins must on no account be used.

Crushing may be done with the hands or with a wooden rammer. For red wine the berries are stripped off the stalks; for white this is unnecessary, as pressing takes place immediately. It is conducted as already described for grape juice—before fermentation for white wine, but after it for red. White wine may be fermented in a storage jar; red should ferment in a wide-mouthed jar or a bread crock, to permit easy removal of skins, &c. In this it remains four to five days, during which the "head" of skins and pips should, twice a day, be pushed down into and well mixed with the liquid. The juice is then pressed out and transfererd to a narrow-necked jar temporarily closed by a vine leaf or a sand bag. Cessation of fermentation is ascertained by lowering a lighted match just within the aperture. If this be no longer extinguished by the carbon dioxide gas, the wine, whether white or red, must henceforth be handled in vessels that are quite full, otherwise it will spoil and become "pricked." After a few months, during which it is racked a couple of times, the wine may be bottled; it will keep for years. Bottling is quite easy. Clean bottles, corks, either tapered or straight, and a 7-foot length of ⅜-inch, thin rubber hose constitute the equipment. This will serve equally well for wine purchased in bulk from a merchant. It is not sufficiently known that excellent wine can thus be obtained at a far cheaper price than bottled wine.

I have not yet touched on sweet wine, which is preferred by some. Such wine can be home made, but the result is usually less satisfactory than with the light dry types already described. Wine of port type must be fortified, and the necessary spirit cannot be obtained in small quantity at the lower excise charged on fortifying spirit.

Wine vinegar is without question the best of all vinegars. It is quite easy to make, and the process comprises two stages. The grapes are first made into light wine as already described, and this wine is subsequently converted into vinegar, by permitting contact with air, in a vessel not quite full and loosely closed with a cloth over the aperture instead of a cork. Conversion occupies a few weeks in warm weather; after its completion the vinegar should be kept in tightly-corked bottles.

Would-be makers of juice, wine, or vinegar are informed that fuller details are contained in a pamphlet entitled, "Home Wine Making," which is obtainable free on application to the Department of Agriculture.

Smithfield Club Show

Interesting Carcass Competition

THE photographs reproduced on the opposite page were taken at the Smithfield Club Cattle Show held recently at the Royal Agricultural Hall, London, and show the champion carcasses of the various classes. The competition attracted 40 carcasses of beef, 99 of mutton and lambs, and 66 of pork. The primary aim of the Smithfield Club is to encourage the selection and breeding of the best and most useful animals for the production of meat and to test their capabilities in respect of early maturity.

Reporting on the pig classes, a London authority pointed out that early maturity is generally believed by breeders to refer only to age for weight, but it really refers more to the rate of change in the proportions or conformation of the body with age. Age for weight is important to the farmer, as the quick-growing pig is cheaper to produce than the slower. On the other hand, age for weight is often achieved without early maturity—that is to say, that while the pig puts on weight rapidly, it retains its youthful conformation, in which head, legs, and fore-end are all larger in proportion to loin and hind-quarters than they are in the mature animal. What is really required, of course, is early maturity combined with good age for weight.

The classes at the Smithfield Show are reported to have shown considerable improvement in this direction, and the high quality of the leading carcasses is indicated by the photographs which were forwarded to the Minister of Agriculture from the Victorian Agent General in London, Mr. W. Leitch.

The champion carcass of beef, which took the Challenge Cup presented by the Worshipful Company of Butchers, was an Aberdeen-Angus steer shown by Mr. W. R. Board, of Great Frampton, Llanwit Major, Cardiff. At 1 year 6 months 3 weeks and 4 days it weighed alive 1,034 lb. and dressed 672 lb., or very nearly 65 per cent. The reserve card went to another Aberdeen-Angus in the same class, the property of Mr. Walter A. Sandeman, of Royston. This steer at a little under 23 months' old scaled 1,141 lb., and had a carcass weight of 737 lb., or 64.5 per cent.

The class for steers or heifers not exceeding fifteen months had a dozen entries, an Aberdeen-Angus-Shorthorn cross, shown by Lord Allendale, was first, another crossbred second, a Galloway third, and a Devon fourth.

In the pork section the champion carcass and winner of the cup presented by the Butchers' Company was a Large White and Middle White cross exhibited by Mr. S. T. Brunt, Bexley. At 4 months 3 weeks and 6 days it weighed alive 129 lb., and dead 100 lb., or 77.5 per cent. The runner-up was a Middle White.

At the sales following the show prices on the whole were satisfactory, considering the state of the trade. In the baby beef class the top price was 10s. per stone (8 lb.), paid for the first prize. Other prices ranged from 5s. 10d. to 9s. 6d. For steers above fifteen months old and not exceeding two years, the champion was sold at 14s. 8d., to which the next highest figure was 11s. 4d. for the King's Red Poll. Other prices ranged from 4s. 10d. to 9s. 4d. For steers above two and not exceeding three years, the first prize carcass went at 7s. 4d. Other prices were from 5s. to 5s. 8d. per stone (8 lb.).

In the long-woolled wether lambs 14s. 4d. per stone (8 lb.) was paid for the first prize carcass, and 11s. 2d. for the second. Other prices ranged from 6s. 2d. to 9s. 4d. The first prize winner in the sheep class was knocked down at 10s. 8d. Other prices were from 5s. 8d. to 8s. 8d. In the short-woolled wether lamb class, the champion (Lady Loder's Southdown), after keen competition, was knocked down at 55s. per stone (8 lb.). The next best price was 18s., paid for the King's unplaced Southdown.

For porkers above 70 lb. and not over 100 lb., 11s. 8d. was paid for the first prize winner, the other numbers being sold at prices ranging from 5s. 8d. to 8s. 10d. per stone (8 lb.).

Champion Carcasses at Smithfield.

1. Three aspects of champion beef carcass, an Aberdeen Angus steer; 2. First Prize baby beef carcass, an Angus-Shorthorn cross-bred heifer; 3. Champion lamb carcass, a Southdown wether lamb; 4. Champion carcass of pork, a Large White and Middle White cross-bred.

Popular Gift Scheme

Presents of Victorian Produce

THE rapid increase in popularity of the overseas gift scheme inaugurated four years ago by the Department of Agriculture is strikingly illustrated by the fact that no fewer than 4,006 gifts were ordered during 1931. This was nearly three times the number ordered in the previous year, and exceeded the aggregate orders from 1927 to 1930 inclusive, 3,873 gifts having been forwarded during that period.

Under the scheme, which has proved so popular both in Australia and overseas, the Department has made available facilities for people in this country to forward to friends and relatives abroad gifts of Victorian primary produce. The suggestion that such a scheme might be of considerable value in making our produce more widely known on the other side of the world, and thus creating a greater demand for the exportable surplus, was put forward first towards the end of 1927. Originally it was designed solely for the forwarding of Christmas presents, but since then the scheme has been enlarged to permit of gifts being sent at any time of the year. Those who desire to send presents to friends in Britain and on the Continent at Christmas, Easter, on birthdays, or at any time throughout the year are afforded the opportunity of sending, without trouble and at a minimum of expense, choice quality samples of Victorian produce such as fruit, wine, lamb, jam, or butter. The gifts available and the prices charged are shown below. These prices include freight and all other charges, including delivery to the home of the recipient.

	s.	d.
10 lb. of choice butter	17	6
30 lb. assorted dried vine fruits	20	0
24 tins assorted canned fruits	25	0
1 carcass of prime lamb	25	0
24 tins of assorted jam	32	6
24 pint bottles assorted wine	40	0
1 case fresh apples (February to May only)	17	6
1 case fresh pears (export season only) ...	20	0

Carton used by Harrod Stores for Packing Victorian Butter.

Mixed Parcels.

For the convenience of those people desirous of ordering smaller quantities and an assortment of produce two mixed cases were included as gifts. One of these consists of 1 lb. butter, 1 lb. each of sultanas, raisins, and currents, 1 tin each of apricots, peaches, and pears, and 3 tins of jam, the price being 12s. 6d. The second mixed case contains the above assortment, with the addition of three pint bottles of wine, the overall charge for this parcel being 17s. 6d. Both these gifts were exceptionally popular. Details of the various gifts ordered are—

541	cases of canned fruit, each containing 24 tins.
388½	cases of dried fruit, each containing 30 lb.
113	cases of assorted wines, each containing 24 pint bottles.
81½	cases of assorted jam, each containing 24 tins.
299	carcasses of lamb.
200½	boxes of butter, each containing 10 lb.
74	cases of apples.
9	cases of pears.
1,057	cases of mixed produce, without wine.
1,242	cases of mixed produce, with wine.

Very many people apparently are using this scheme regularly to fulfil their oversea gift arrangements, and each year the great bulk of the recipients write to express their complete satisfaction with the quality and packing of the produce and the method of delivery. Hundreds of letters received by the Department describe the endeavours of the recipients of the gifts to obtain further supplies of such Australian produce. One of many expressions of appreciation is quoted: "The apples were the best ever seen. They were shown to the local fruit storekeeper, who stated they were better than any he had ever handled."

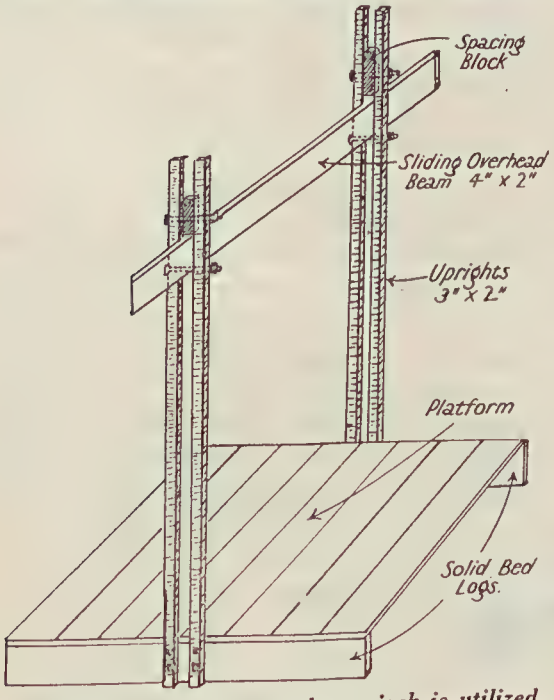
After four years successful development by the Department of Agriculture, the Melbourne *Herald* inaugurated a "Christmas Lamb" campaign, which, after intensive publicity, resulted in nearly 3,000 carcasses of Victorian lamb being shipped in the *Largs Bay* in October for delivery in Great Britain. Some Melbourne business firms also conducted a similar business with boxes of assorted dried fruits.

Apart from the valuable advertisement Victorian produce has received from the departmental and supplementary schemes, it has had many direct benefits. One of these is referred to in a letter received recently from the Victorian Trade Commissioner in London, who states that "through his efforts in connexion with the scheme, the Harrod Stores, one of the most important emporiums in London, are making a special feature of highest quality Victorian butter. They are supplying their customers with this butter wrapped in good quality paper, and packed in cartons as per sample." A photograph of the carton being used by the Harrod Stores is reproduced herewith.

Tobacco Growing *(continued from page 126).*

will be found useful to keep the lever in position when removing the sides of the press.

An ordinary jack fitted above the lid is a much more convenient method of applying pressure. Some modification of the staging is necessitated under these circumstances. A portable staging could be constructed as follows:—The platform should be built on two solid bed logs 4 feet long, and 3 feet from centre to centre. Portions of an old railway sleeper serve admirably for this purpose if set up on edge.



Portable staying for use when a jack is utilized as the source of pressure.

Two uprights 3 inches x 2 inches should be bolted 1¾ inches on either side of the centre of each bed log. These should be of sufficient length to allow the convenient insertion of the jack between the lid of the press and the cross-piece referred to immediately below. Holes of sufficient size to carry ½-in. bolts should be bored through these uprights 12 inches from their end. Each pair of uprights should be bolted together with a 2½-in. spacing block between them. This will allow the insertion of a cross-piece to carry the upward thrust. A piece of 4 in. x 2 in. serves satisfactorily. The cross-piece is held in position by two pegs fitted through holes bored 4¼ inches below the lower surface of the spacing block. This cross-piece is removable when filling the press.

A desirable type of tobacco press embodying various refinements is now on the market. This press is shown in the accompanying illustrations.

F.A.Q. Wheat

Analysis of 1932 Sample

By W. R. Jewell, M.Sc., Agricultural Research Chemist.

THE F.A.Q. wheat sample this year has a very high bushel weight (62¾ lb.), particularly when compared with the abnormally low figure of 58½ lb. for last year's wheat. The sample shows a marked improvement as far as appearance is concerned, the proportion of bleached grain being almost negligible compared with last year. In accordance with the practice for the past few years, a portion of the F.A.Q. sample was critically examined and subjected to analysis and to a milling test in the experimental flour mill.

The moisture content of the wheat this year is normal. The percentage of screenings is considerably higher than usual. This includes the usual collection of weed seeds and foreign grain and withered and broken wheat. The seeds identified included oats, thistles, rape, millet, bindweed, barley, dock, brome, and canary grass. Protein content is a little lower than usual, the percentage being lower than has been recorded during the past four years. Analytical results, compared with past years, are—

—	1927.	1928.	1929.	1930.	1931.	1932.
	%	%	%	%	%	%
Moisture	9.47	9.41	9.20	10.58	11.43	9.31
Impurities (screenings)	3.4	2.5	3.4	2.7	3.5	6.7
Ash	1.36	1.47	1.26	1.33	1.47	1.41
Protein (N. × 5.7) ..	9.28	11.63	10.11	10.87	10.97	9.66

Flour.

No difficulty was experienced in milling, and the flour yield was normal. As would be expected from the protein content of the wheat, the protein and gluten contents of the flour are lower than last year, and are slightly lower than the average for the past five years. The quality of the gluten was not particularly good.

The test loaf obtained by the standard baking test was slightly better than would be expected from the flour, and its loaf volume approached the average for the past five years. Comparative figures since 1927 are—

—	1927.	1928.	1929.	1930.	1931.	1932.
Flour—	%	%	%	%	%	%
Yield	69.5	70.0	70.4	73.2	73.4	72.84
Ash	0.53	0.48	0.41	0.49	0.54	0.56
Protein (N. × 5.7)	8.26	10.11	9.20	9.54	9.58	8.65
Wet Gluten ..	23.6	31.3	25.8	26.4	29.4	26.1
Dry Gluten ..	7.9	10.4	8.5	8.6	9.7	8.7
Water absorption (qts.)	40.2	45.0	45.2	41.0	40.5	40.5
Standard Loaf Volume (c.c.)	1,580	1,680	1,525	1,610	1,760	1,585

Bran and Pollard.

Normal yields of bran and pollard were obtained, and analytical data are recorded in the following table:—

—	1927.	1928.	1929.	1930.	1931.	1932.
Bran—	%	%	%	%	%	%
Ash	3.76	3.68	4.67	3.55	4.27	3.76
Protein (N. × 6.25)	12.60	15.77	13.52	15.31	15.57	15.37
Pollard—						
Ash	2.29	3.26	2.52	2.47	3.17	2.85
Protein	14.25	17.50	14.83	15.09	15.42	14.74

Orchard and Garden Notes

By Edward E. Pescott, F.L.S.

The Flower Garden.

THIS is the month when special attention is paid to Azaleas and Rhododendrons. These charming garden shrubs are increasing in popularity every year. There are some very beautiful improvements in colours in the modern types, especially in the Azaleas, which are now obtainable in coppery, apricot, and almost crimson shades. These shrubs should not be grown where they cannot receive regular summer waterings, as they make growth and flower buds during that season.

In addition to summer watering, these plants should have partial shade, especially from the midday and afternoon sun. They are all surface rooting shurbs, and no cultivation should ever be done within a foot or two of the plant. Top-dressing, once or twice a year should take the place of cultivation. Top-dressing material may be either fresh light soil, leaf mould, cow, or sheep manure; the two latter are specially favoured by these plants.

Azaleas and Rhododendrons prefer an acid soil; and their roots should never have lime placed near them. Acidity of soil for these plants is readily obtained by humus or manurial top-dressing and an absence of lime.

For general garden work, all winter flowering annuals should be transplanted from the seed-beds into the garden. Among these are Primula, Iceland Poppy, Wallflower, Stock, Pansy, and Carnation. All of these plants should have a sunny position; and lime should be given to Wallflowers, Stocks, and Carnations. Pansies favour a considerably quantity of cow manure. Iceland Poppies should not have lime, as that encourages the decay of the plants by wilt. If wilt occurs, the plants should be well sprinkled with Cheshunt compound.

Ranunculus and Anemone corms should be planted into a well-manured lime-free soil,

Azaleas.

Daffodils, Hyacinths, and Tulips should also be set; lime may be given to these.

The Vegetable Garden.

If not already done, seeds of cabbage, cauliflower, Brussels sprouts, turnip, carrot, and parsnip should be sown. Seedlings of the three former may be set out in the rows, leaving at least a foot between the rows, to allow of cultivation and the subsequent "hilling" of the soil around the plants. When the plants are growing strongly, the soil should be worked up around the stems, so that an additional root system will be obtained. Onion seed may be sown, either in beds or in the rows. While any of the silver skin varieties are suitable for an early crop, the Brown Spanish variety is the one usually grown for the main crop.

The Orchard.

At this season, the attention of orchardists is turned to the question of green manures, or the principle of sowing a cover crop in autumn, to be ploughed in during the spring. Leguminous crops are generally selected, because they grow freely and produce a good crop, and because of their nitrogen content. Such seeds as field peas, tares, and beans are sown. Sowing should be done as early in autumn as possible, so that good strong plants may be established before winter, when little or no growth occurs.

Other crops grown are various clovers, especially Subterranean Clover, King Island, or other Melilot, barley, and rape.

Stallion Register 1931-32

(Under the Horse Breeding Act 1928)

List of Stallions in respect of which Certificates of Registration have been refused but which, the owners having paid the prescribed fees, may be retained for breeding purposes with owners' own mares. Registrations prior to 1st March, 1932.

Name.	Age.	Class.	Owner.	Address.
Admiral II.	A	Draught	Pollard Bros.	Tolmie P.O.
Bangaroo Style	4	,,	G. Hounsell	Jeparit
Barb	6	,,	H. Singh	Pier Millan
Barfold	A	,,	N. J. Hanrahan	Barfold
Baron Black	4	,,	H. E. Gregory	Hopetoun
Baron King	4	,,	Bouchier Bros.	Nyamville
Baronet	A	,,	W. Cameron	Lascelles
Basil More	A	,,	W. Bilstein	Pirlta
Bonny Obedience	6	,,	C. Storer	Branxholme
British Banker	3	,,	H. G. Westphal	Gelantipy
Buchlyvie Again	A	,,	J. H. and W. Oldfield	Nhill
Captain	5	,,	W. H. Fisher	Boolarra
Captain Nelson	3	,,	G. J. Officer	Woolsthorpe
Captain Regulus	3	,,	R. Phillips	Tatyoon
Champion	A	,,	Mrs. B. Willmott	Trentham
Clem Junior	A	Pony	N. Cole	Camperdown
Clyde	A	Draught	C. Hebard	Coleraine
Coil	A	Light	W. Craven	Heathcote
Dandy Bill	A	,,	H. Spice	Bacchus Marsh
Davison	5	Draught	R. N. Ronalds	Birchip
Doctor Mannix	A	,,	A. Sherwell	Patchewollock
Donald	A	,,	Smart Bros.	Gooramadda
Fish Creek Baron	A	,,	J. J. Mackin	Fish Creek
Flash Direct	A	Light	C. T. Evans	Rathscar
Flash Glen	A	Draught	H. R. Richards	Trawool
Flash Light	4	,,	L. J. Mason	Warracknabeal
Flashlink	6	,,	T. H. Grose	Buckrabanyule
Flash Mac	5	,,	L. M. Simon	Pinnaroo
Ginger Meggs	4	,,	I. W. Curnow	Sea Lake
Ginger Mick	3	,,	W. H. Lane	Kulwin
Grand Star	A	,,	A. Wohlers	Mount Wallace
Greenoak Ideal	3	,,	E. F. Arthur	Warracknabeal
Gun II.	3	,,	T. J. and J. McNamara	Omeo
Hill King	A	Light	A. E. Cumming	Berrimal
Jimmy	A	,,	H. McFarlane	Merino
Kennedy's Pride	4	Draught	H. F. Mathison	Maffra
Lord Nolan	A	Pony	W. Hubble	Maryborough
Marcellus Pride	A	Draught	A. C. Gready	Carron
Munro Boy	4	,,	F. H. Coombs	Mangalore
Nailstone Barossa	5	,,	O. McCabe	Underbool
November	A	Light	Ramage and Mason	Violet Town
Nugget	A	Draught	G. Lord	Eskdale
Ondit	A	,,	Executors N. Thornley	Hawkesdale
Paul	A	,,	D. A. Zippel	Wonwondah
Pedro Pronto	A	Light	Geo. Stow	Prahran
Peter's Pride	3	Draught	M. Straul and K. Chislett	Berriwillock
Pettadale's Pride	4	,,	D. Green	Nullawil
Prince Edward	A	,,	T. Hennessy	Gowangardie
Prince Imperial	A	,,	M. McNee	Nandaly
Punch	A	,,	Mrs. J. McLean	Garfield
Punch	A	,,	W. Earl	Woodside
Regent	4	,,	C. Nelson	Benalla
Repeater's Pride	A	,,	A. N. Flavel and W. J. Pitt	Jeparit
Royal King	A	,,	D. Gorman	Crossley
Royal Newton	5	,,	J. Warwick	Strathallan
Royalston	6	,,	W. G. Ballantine	Cosgrove

STALLION REGISTER 1931–32—*continued.*

Name.	Age.	Class.	Owner.	Address.
Scotland's Duke	A	Draught	H. F. Quick	Brim
Scotland's Pride	3	,,	T. Daffy	Swan Marsh
Scottish Knight	4	,,	J. H. Muller	Nagambie
Scotty	A	Pony	E. J. Simmonds	178 Sternberg-street, Bendigo
The Rising Tide	3	Draught	J. Bagnell	Mologa
Warrior	4	,,	R. Walpole	Cherrilong
Warwick	A	Light	W. H. Rogers	Nar Nar Goon
Werndew Golden Chance	4	Draught	R. A. Perkins	Rainbow
Young Advance	A	,,	W. F. McAlpine	Lascelles
Young Harold	A	Pony	W. Newton	Cape Bridgewater

Rainbow Wheat Tests

THE wheat variety and manurial experiments conducted by the Department of Agriculture at Rainbow were commenced in 1926. For four years they were conducted on the farm of Mr. A. L. Harris, but last year were transferred to the property of Messrs. West Bros. The soil on both sites is a typical red sandy Mallee loam.

In the variety trials seven wheats were tested under the replicated system, five plots 1/40th acre in area being sown to each variety, with 75 lb. of seed and 120 lb. of super. per acre. The results were:—Ranee 4H, 26.7 bushels per acre; Sepoy, 26.6; Free Gallipoli, 25.6; Ghurka, 25.0; Federation, 23.5; Penny, 21.5, and Nizam, 21.1 bushels per acre.

Ranee 4H, which gave the highest yield last year, is a selection made at the State Research Farm, Werribee, from Ranee, and in tests in various parts of the wheat belt in the last few years has yielded appreciably better than the original strain.

Of course one year's results cannot be taken as a reliable guide, but the tests at Rainbow have now been conducted for a sufficient length of time to permit of fairly definite recommendations being made as to the varieties suitable for the district. Taking the average results for the past three years, Ghurka has given the highest yield, 18.7 bushels per acre, followed by Free Gallipoli, 18.0; Ranee, 17.7; Sepoy, 16.9; Nizam, 15.6; Federation, 14.6; Penny, 13.2 bushels per acre.

Ghurka, which has yielded consistently well during the three years it has been included in the tests, is a short strawed, midseason to late variety which, during the past five or six years, has given excellent results in districts as far apart as Willaura, Longerenong, Rutherglen, Swan Hill, and Shepparton. This variety then, together with Free Gallipoli, Ranee, and Sepoy, all three of which have also given consistently good yields, can be definitely recommended for use at Rainbow in preference to Federation and Penny, of which fairly extensive areas are still grown in the district.

The results of the manurial tests for the last five years are summarized in the accompanying table:—

—	Average Five Years 1927–31.	Increase over No manure.	Value of Increase. 3s. per Bushel.	Cost of Super. at £5 per Ton.	Increased Return per Acre.
	Bushels per Acre.	Bushels per Acre.	*s. d.*	*s. d.*	*s. d.*
No manure	9·9	..	..	..	..
Super. ½ cwt.	10·9	1·0	3 0	2 6	0 6
,, 1 cwt.	12·2	2·3	6 11	5 0	1 11
,, 1½ cwt.	12·6	2·7	8 1	7 6	0 7

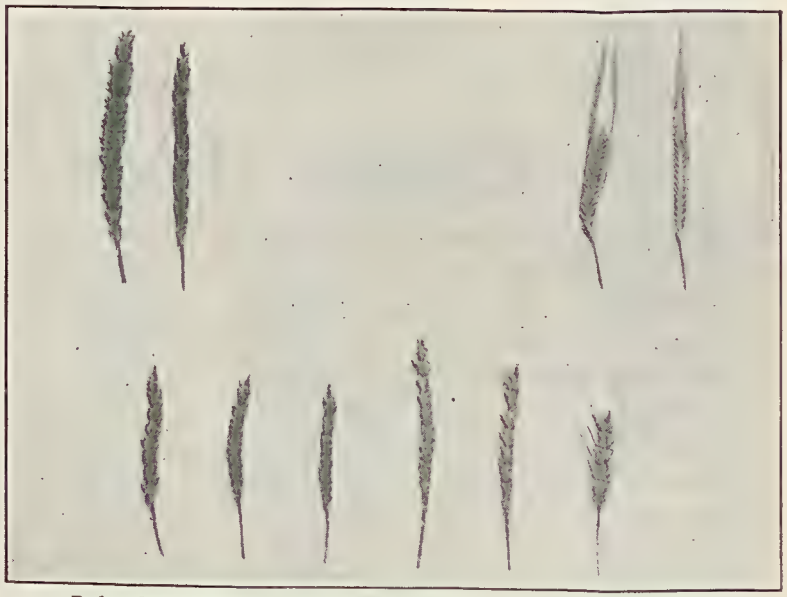
Professional Papers

[This section is devoted to professional papers and articles of a scientific character.]

Wheat-Barley Matings

By G. S. Gordon, Cerealist; and A. R. Raw, M.Agr.Sc., Cereal Geneticist.

THE problem of intergeneric hybridization is one that is attracting the attention of plant breeders throughout the world, and, in view of this, it has been deemed advisable to publish the following observations dealing with the fully fertile progeny which have arisen as a result of wheat-barley matings at the State Research Farm, Werribee. Up to the present, the majority of workers have been focussing their attention on the production of wheat-rye hybrids, with the object of transferring such desirable rye characters as winter hardiness, tough straw, drought resistance, and adaptability to poorer soils to the wheat plant. So far as is known, the results of the attempts of workers to mate wheat and barley have not been published, and, in view of this, the writers desire to submit the following observations and suggestions, rather in the form of a problem inviting discussion, than as a dogmatic statement regarding the actual alterations induced in the chromosome system of the female organism, as a result of such matings.



Bobs-Golden Grain Mating—Types of segregates appearing.

Top: Parent Forms; Left, Bobs; Right, Golden Grain. Lower: Progeny of mating. Note variations in chaff colour and degree of awn exhibited.

Although numerous workers have attempted to mate the vulgare wheats with the cultivated barleys, there is some doubt as to the degree of success that has been achieved. The unbalanced chromosome complex of 21 and 7 appears to be an insuperable difficulty, and it is doubtful whether any pairing of chromosomes takes place. The wheat varieties, Bobs and Canberra, which were produced by the late William Farrer, are reputed to have arisen as a result of wheat-barley matings. Numerous attempts to repeat these matings have been made without success. Waterhouse records that 1932 pollinations of wheat by barley failed to produce a single hybrid plant, and states that there appears to be a doubt as to whether the claims regarding the origin of Bobs and Canberra can be substantiated.

Numerous matings have been attempted at the State Research Farm, Werribee, but, while the plants produced have segregated in different ways, in the majority of cases the evidence available is insufficient to indicate a definite hybrid origin of these forms. From 1913 to 1922, several wheat-barley matings

were made, and the genetic behaviour of the resulting plants has been observed. The data available, however, are really insufficient on which to base any definite conclusions, but there are indications of an upset of the chromosome balance of the parent forms.

During 1913, the first attempts were made to mate the wheat variety, Bobs, with Golden Grain barley. Bobs is a typical vulgare form, which is reputed to have originated as the result of a mating of Nepaul barley (*Hordeum vulgare trifurcatum*) with Early Lambrigg wheat. It is an early maturing variety, having hollow, thick walled, yellow straw. The ear is long, tapering, lax and beardless, and the chaff is white in colour, and glabrous. The grain is semi-translucent, small, and shotty in character. In all cases in which it was employed, Bobs was used as the ovule parent. Golden Grain, which was used as the pollen parent, is a typical form of Hordeum distichon, nutans, a common two-rowed barley.

In the case of the 1913 matings, it is recorded that the F 1 plants were botanically indistinguishable from Bobs, but in the F 2 a segregation to red and white chaffed, bearded and beardless, and early and late maturing forms occurred. In the F 3 generation, five families segregated to red and white chaffed, bearded and beardless, and early and late maturing forms. All plants were lax and tapering, and no *barley* types appeared. In the following year, eleven F 4 families again produced all the types recorded above, but no figures are available regarding the actual ratios obtaining. In 1915, a further series of matings was made, resulting in the setting of six grains, all of which produced plants the following year. Most of these plants were found to differ to a greater or lesser degree from the Bobs parent, which was grown in an adjoining row. The plants were divided into two groups, and were described as follows:—

Group I. Plants 1–3. Tall, hollow straw. Ear long, lax, tapering, tip-awned. Chaff red, glabrous. Grain large, not as shotty, translucent, or as hard as that of Bobs.

Group II. Plants 4–6. Straw shorter than Group I forms, hollow. Ear long, lax, tapering, beardless. Chaff white, glabrous. Grain large.

The F 2 families arising from these plants were found to be heterozygous for the bearded character, and for chaff colour. The ratios obtaining in each family were very irregular, the numbers of the different segregates appearing being as shown in Table I.

TABLE I.—BOBS x GOLDEN GRAIN. SEGREGATION OF F 2 FAMILIES.

Family.	Red chaff, lax, tapering.			White chaff, lax, tapering.		
	Beardless.	Tip-awn.	Bearded.	Beardless.	Tip-awn.	Bearded.
1	69	20	17	25	8	7
2	81	18	..	21	5	..
3	..	73	..	..	..	..
4	..	..	..	58	30	20
5	4	2	..	38	40	..
6	..	..	..	82	45	..

It will be observed that no two families segregated in a similar manner. In regard to the classification of forms in respect of chaff colour, the records show that varying intensities of colour were found to exist, and in some cases the types occurring were rather indefinite. Thus, in the case of family 3, fifty-five plants were found to have chaff of a deep red-brown colour, while the remaining eighteen were very pale types, presenting an almost perfect 3 : 1 ratio of dark to pale forms. Families 4, 5 and 6, all contained a number of plants in which the outer glumes were streaked with brown. These have all been classed as white chaffed types. The plants have been classified into six groups, depending on chaff colour, and the degree of awn or beard exhibited. It will be observed that, in so far as awn characters are concerned, three types occur, namely, beardless, tip-awned, and full bearded. The full bearded character has appeared in only two families, but the tip-awned form is present in all six. The behaviour of families 4–6 is of interest, since these progenies, arising from beardless plants, contained a number of tip-awned, and, in the case of family 4, bearded forms. In addition, family 5, the progeny of a white chaffed type, contained a number of red chaffed plants.

In all cases, the segregations are extremely irregular, and do not even approximate to any typical Mendelian ratio. Twenty selections from these families were carried on as F 4 cultures in 1926. A number of these segregated in regard to the above characters, but no counts are available to denote the ratios obtaining. No plants exhibiting barley characters occurred in any of the segregating families. One selection from an F 5 family is still being continued, and this shows distinct variations from the variety, Bobs. The ears are longer

and more lax, the spikelets are slighty larger, and the beak and lateral point of the outer glumes are more clearly defined than in the case of the parent type. The chaff is of a pale brown colour, and the ear is tip-awned. The selection appears to have an inherent tendency to throw bearded forms, and forms having chaff of a deep red-brown colour. This segregate is a typical 21 chromosome form.

During 1922, further matings were made between these varieties, and two grains were set. These produced plants the following year. The F 1 plants were observed to be very similar to Bobs, except for the fact that the habit of growth was more spreading, and the chaff was slightly tinged with brown. In 1924, the F 2 family from one of these plants was found to be heterozygous for the factors for chaff colour, beardedness, and straw texture. In addition, eighteen dwarf forms made their appearance. There is no record of the actual numbers of segregates appearing in this family. It is interesting to note that a row of Bobs, grown for purposes of comparison, did not develop dwarf forms. Fourteen F 3 families were grown in 1925, and, with one exception, these again segregated in regard to the above characters. The genetical behaviour of these forms is summarized in Table II.

TABLE II. BOBS x GOLDEN GRAIN. F 3 FAMILIES. 1925.

Family.	Parent Characters.	Behaviour of F.3 Family, 1925.
1	Ear long, lax, tapering, beardless. Red chaffed	Segregating to Normal and Dwarf forms
2		Segregating to Bearded and Beardless forms
3		Segregating — Normal — Dwarf, Bearded—Beardless forms
4		Segregating — Normal — Dwarf, Bearded—Beardless forms
5		Segregating to Bearded and Beardless forms
6	Tip-awned	Segregating Chaff colour, Bearded —Beardless forms
7	Red chaffed	Segregating Chaff colour, Normal —Dwarf, Bearded—Beardless forms
8	Ear long, lax, tapering, beardless. White chaffed	Segregating to Bearded and Beardless forms
9		Segregating to Normal and Dwarf forms
10		Segregating to Bearded and Beardless forms
11		Segregating — Normal — Dwarf, Bearded—Beardless forms
12		Segregating to Normal and Dwarf forms
13	Tip-awned	Not segregating. Homozygous
14	White chaff	Segregating to Normal and Dwarf forms

It will be observed that two families were heterozygous for chaff colour, and nine for the bearded character, but there are no figures to denote the actual numbers of segregates occurring. Eight families segregated to normal and dwarf forms, and the figures obtaining for seven of these are presented in Table III. In the case of the remaining family, no figures were available.

TABLE III. BOBS x GOLDEN GRAIN. F 3 FAMILIES. 1925.

Segregation to Normal and Dwarf Forms.

Family.	Total Plants.	Normal Forms.	Dwarf Forms.
1	107	89	18
3	102	82	20
4	106	90	16
9	90	80	10
11	89	72	17
12	92	78	14
14	91	77	14
Total observed ..	677	568	109
Calculated 13 : 3 basis	..	550.06	126.94 $\sigma = 10.17$

The figures indicate a rather loose approximation to a 13 : 3 ratio, which would indicate the presence of a dominant dwarf factor, D, which would produce dwarfs except in the presence of an inhibitory factor I, which always leads to the production of normal forms. No plants exhibiting *barley* characters were observed, and none of the families was carried past the F 3 stage.

During 1922, flowers of the wheat variety Comeback were treated with pollen of the barley variety Golden Grain. Four grains were set, all of which produced plants the following year. Three of these F 1 plants were typical dwarf forms, which failed to reach maturity. The fourth plant was discarded as being identical with the Comeback parent. Further matings were attempted in 1922, using the barley variety Cape, a typical pallidum form, as the female parent. In the first case, Hard Federation (*T. vulgare*), was used as the pollen parent, and one grain was set. This gave rise to a plant the following year. The F 1 form was not as tall as the Cape parent. In addition, it was much later in maturity, and of a darker colour. The auricles and straw were of a purple colour, as compared with the yellow auricles and straw of the Cape form. The ear was two-rowed, as distinct from the

normally recessive six-rowed character of the ovicle parent, bearded, and lax. It is recorded that the F 1 plant showed some resemblance to the pollen parent. The F 2 family segregated to two and six-rowed forms, and to types with yellow and purple straw. Of a population of 130 plants, 87 were found to be two-rowed and 43, six-rowed types. No figures are available regarding the segregation to straw colour. The small number of individuals makes it difficult to determine the exact nature of the ratio obtaining for the segregation to two and six-rowed forms. Further notes indicated that a number of F 4 and F 5 families segregated in regard to the characters indicated above, but no information is available regarding the ratios.

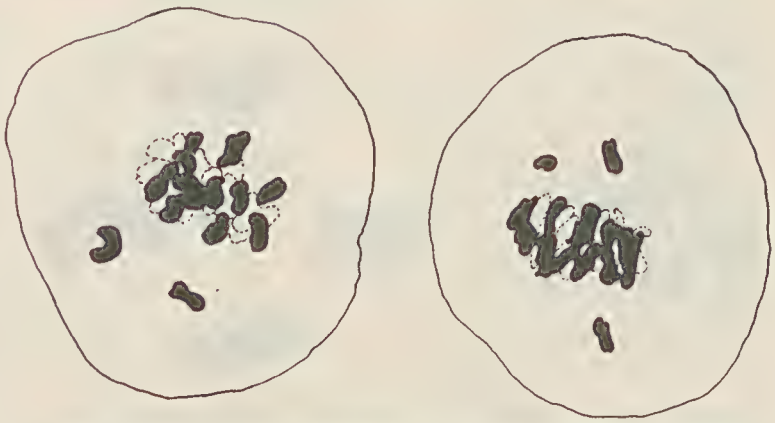


Fig. 1.—Brevet—White Hull-less F 2 progeny. Heterotypic metaphase showing univalent chromosomes scattered at random in the cell.

In the second case, a purple strawed selection of Indian 7 (*T. sphaerococcum*), was used as the male parent, and two F 1 plants were produced in 1923. These differed from the ovule parent in that they were darker in colour, and were again two-rowed forms. In 1924, two F 2 families segregated to two and six-rowed forms:—

—	Two-rowed.	Six-rowed.
Family 1	91	46
Family 2	97	52
Total ..	188	98

As was the case in the Federation-Cape mating, the ratios are very indefinite. A number of F 4 and F 5 families also segregated to two and six-rowed forms, but no figures are available to indicate the ratios obtaining. There was also a segregation in regard to grain colour, golden yellow, and dark grey types being observed. No plants exhibiting *wheat* characters were observed in the progeny of these matings.

Since 1922, further attempts have been made to mate wheat and barley varieties, but in all cases but one, failure has resulted. In the case of the exception, an F 1 plant, the progeny of a Brevet-White Hull-less mating, showed marked variation from the parent forms. The plant was characterized by the short spindly nature of the growth made, and by the lateness of maturity exhibited. The foliage was of a light green colour, suggestive of a barley. The leaf sheath had a purple tinge, which was absent from the ovule parent. The auricles were larger, and of a deeper reddish purple colour than those of the Brevet parent. The ear was long, lax, tapering, glabrous, and beardless, as compared with that of Brevet, which is square, blunt, medium, dense, pubescent, and beardless. The grain from this plant was shrivelled, but was viable.

In the F 2 generation, six types of plants were produced. All were of later maturity than either parent, and all were distinct wheat types, no *barley* characters being apparent. As in the case of the F 1 plant, the pubescent character was entirely absent. The plants showed a marked degree of variation in ear characters, and were classed as follows:—

Type 1.—Red chaff, glabrous, beardless, square, blunt, dense ear, inclined to clubbiness—4 plants.

Type 2.—Red chaff, glabrous, beardless, square, lax, tapering ear—3 plants.

Type 3.—Red chaff, glabrous, tip-awned, square, tapering, lax ear—4 plants.

Type 4.—White chaff, glabrous, beardless, square, slight taper, lax ear—3 plants.

Type 5.—White chaff, glabrous, tip-awned, square, tapering, lax—3 plants.

Type 6.—White chaff, glabrous, square, dense, blunt, tip-bearded—2 plants.

The appearance of red and white chaffed, and of awned and awnless segregates is of interest, since it is suggestive of the types appearing in the segregating generations of the Bobs-Golden Grain matings, and more especially

so in view of the fact that the brown chaffed plants were very pale forms. The variations in ear shape and density were most marked, and are worthy of note, as is the fact that all plants were particularly late maturing forms. The types appearing do not conform to any denite Mendelian ratio.

All plants exhibited a marked degree of sterility, but it is considered that this was due to thrip infestations during the flowering period in late October. The female parent, Brevet, which flowered from ten to fourteen days earlier, also produced a number of flowers which failed to set seed, though, in this case, the degree of sterility was not so marked.

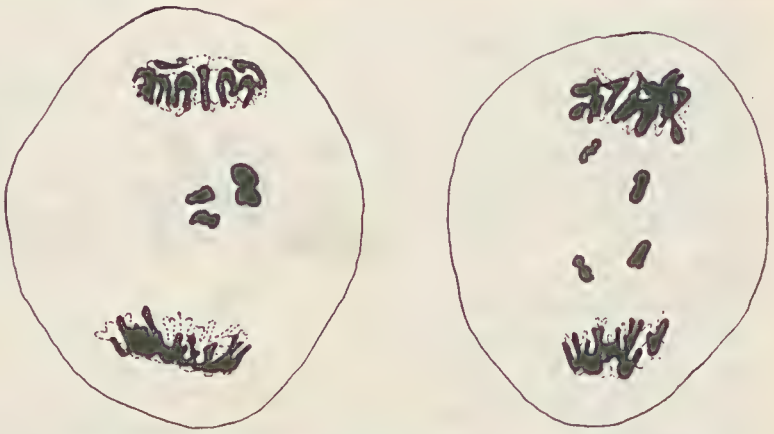


Fig. II.—Heterotypic telophase ; lagging univalent chromosomes undergoing division and passing to the poles of the cell.

Cytological investigations on F 2 material arising from these Brevet–White Hull-less matings reveal striking irregularities in chromosome behaviour in the first and second meiotic divisions. The complement of these plants is normally 21, indicating that they are typical vulgare forms, but occasionally, cells are observed in which the chromosome number is abnormal, and, up to 24 chromosomes have been recorded in some of the cells during the meiotic divisions.

In the heterotypic prophase, the behaviour of the chromatic material appears to be normal until diakinesis. In the metaphase, however, the 21 bivalent chromosomes arrange themselves in the equatorial plate in the normal manner, but in cells of abnormal chromosome content, the univalents remain scattered at random throughout the cell (Figure I.). Cell division then proceeds normally, the bivalents splitting, and the halves going to either pole. At, or just prior to the heterotypic telophase, the univalents arrange themselves across the equatorial plate, and divide, the daughter chromosomes travelling more or less evenly to either pole of the cell (Figure II.). The division of these lagging univalents may, however, be delayed until the late telophase, or until cell division is almost complete. In such cases, the daughter chromosomes may remain in the same cell. In exceptional cases (Figure III.), the division of these univalents has been so delayed that the cell wall has been formed before it was complete, with the result that the actual division has occurred within one of the daughter cells. In such cases, the univalents are excluded from the daughter nucleii and become lost.

Fig. III.—Cell division almost complete. Lagging univalent chromosomes undergoing division in one daughter cell.

Chromosome behaviour in the homoeotypic division is very similar to that in in the heterotypic stage. The normal prophase is followed by the grouping of the 21 bivalents across the equatorial plate, and the scattering of the odd univalents at metaphase (Figure IV.). The division of the bivalents is again normal, and is

followed at the telophase by the division of the lagging univalents (Figure V.). The behaviour of these univalents is unexpected, since the accepted theory in wheat species crosses is that division of the univalent chromosomes occurs at one of these stages only. There is, however, definite cytological evidence that the lagging univalents in the progeny of the Brevet-White Hull-less mating do divide. As in the heterotypic division, the univalents pass more or less evenly to either pole, but, again, the lag may be so marked as to prevent the inclusion of these chromosomes in the daughter nucleii, resulting in their loss.

Fig. IV.—Homeotypic metaphase showing univalent chromosomes scattered at random in the cell.

All preparations were made by Belling's aceto carmine method, and all figures are camera lucida drawings from these at a magnification of 1,357 X.

Discussion.

It is obvious, from a review of the evidence available, that some factor is operating to disturb the chromosome balance of the ovule parent in each of the cases investigated. The possibility that out-crossing has occurred in all cases under examination is extremely remote. The fact that the progeny arising from the three distinct series of matings in which the wheat variety Bobs was used as the maternal parent, behaved in a similar manner in the segregating generations, is sufficient to exclude the possibility that the entrance of foreign pollen was responsible for the segregations occurring. The behaviour of the plants arising from matings in which the barley variety was used as the ovule parent supports this view. In addition, the irregularity of the ratios obtaining in the segregrating generations of all cases, furnishes further definite evidence in opposition to the out-crossing theory.

It is equally certain that normal fertilization of the female by the male parent has not occurred, though the appearance of dwarf forms in the F 1, F 2, and F 3 generations of wheat-barley matings might be accepted as evidence in support of the possibility of such a process having taken place. The fact that the wheat varieties Bobs and Comeback, when mated with other varieties of wheat, tend to produce dwarf forms in the segregating generations, detracts from the value of this evidence. The main evidence in support of the theory that fertilization of the wheat ovule by the barley pollen, or the barley ovule by the wheat pollen, has not occurred, is furnished by the fact that in only one case did the F 1 or F 2 plants exhibit any degree of sterility, and in this case it is considered that the failure to set grain was due to thrip attacks during the flowering stage. This evidence must be accepted as definite, since the unbalanced chromosome complex of 21 and 7 would necessitate the production of partially or totally sterile hybrids in the F 1 and segregating generations. The fact that none of the plants arising from the matings exhibited any of the characters of the male parent, may be taken as evidence in support of this, though, in this case, the evidence cannot be accepted as being quite so definite, because of the fact that numerous cases of maternal inheritance involving the masking of some or all of the characters of the male parent have been reported.

It is obvious then, from the above, and from the cytological investigations on the progeny of the Brevet–White Hull-less mating, that no pairing of the wheat and barley chromosomes has occurred, though it is equally apparent that the seven barley chromosomes have been introduced into the wheat ovule, and are gradually being eliminated from the resulting organism on account of their irregular behaviour during the process of cell division. The irregularities observed in the meiotic divisions of the Brevet–White Hull-less progenies are sufficient to justify the assumption that the lagging chromosomes are those of the barley

parent, and the fact that the lagging may be so pronounced as to exclude all the univalents from the daughter nucleii, and the irregularities occurring in the distribution of these univalents to the daughter cells are sufficient to account for the gradual elimination of the barley chromosomes from the organism.

Fig. V.—Homeotypic telophase; lagging univalent chromosomes undergoing division.

The question now arises as to how the normal chromosome complement of the progeny of these wheat-barley matings is restored. Under normal conditions, the introduction of the 21 male chromosomes to the 21 chromosome ovule results in the formation of an organism having a somatic complement of 42 chromosomes. In this case, however, only seven male chromosomes have been introduced to the ovule, and these being incompatable with the female chromosomes, have upset the chromosome balance of the organism, and resulted in drastic internal changes in the chromosome system of the ovule. It is obvious that the only manner in which the normal somatic chromosome content can be restored is by a doubling of the chromosomes in the ovule. That this has occurred is apparent, since the cytological investigations have revealed that the plants arising from these matings are typically 21, ($2n = 42$) chromosome forms. That doubling of the chromosome number in plants and animal cells does occur is a generally accepted fact, and the three wheat species are believed to have arisen in this manner. Such increases have, however, resulted in the doubling of both haploid and diploid numbers, while in the case under consideration, it is suggested that the doubling of the haploid number has occurred in the ovule in order to restore the normal diploid number, the process involved being similar to that suggested by Tjumjakoff for the production of highly fertile wheat-rye intermediates with 56 chromosomes. Winge has stated that where harmony is insufficient for the pair action necessary to development, all of the chromosomes in the zygote may split longitudinally the resulting halves acting in pairs throughout the development of the organism.

It is possible that the attempted fertilization of the wheat or barley ovule by the barley or wheat pollen, has resulted in a stimulus being given to the ovule, thus inducing abnormal behaviour. That such doubling of the chromosomes can be induced mechanically or chemically by treatment with potassium chloride has been demonstrated by numerous workers, and the ease with which the chromosome mechanism can be disturbed by such methods, or by the application of X-Rays is definite proof regarding the delicate nature of the balance.

The splitting and reshuffling of the chromosomes of the ovule parent must, of necessity, be accompanied by the loss of some of the genes, and a change in the character of others. Such changes from the dominant to the recessive state are of fairly frequent occurrence, and Waldron has employed this theory of gene lability to explain the irregular ratios obtaining for the occurrence of normal and dwarf forms in wheat crosses.

That such changes do occur is demonstrated by the regularity with which recessive white chaffed plants make their appearance in pure line pedigree cultures of typical red chaffed forms, bearded forms in normally beardless populations, and vice versa. The occurrence of forms having light red chaff among the progeny of the Bobs–Golden Grain matings suggests that the chromosomes carry factors for different intensities of colour.

The assumption of the theory of gene change and elimination is necessary to account for the irregularity of the ratios obtaining, and for the appearance of forms possessing characters dissimilar to those of either parent. It is apparent that the barley chromosomes exert no influence whatever in determining the characters of the progeny when wheat is used as the ovule parent, and similarly, when barley is employed as the female parent, no wheat characters make their appearance.

The data available is barely sufficient on which to base definite conclusions, but the behaviour of the progeny of these wheat–barley matings furnishes unquestionable evidence that chromosomal aberration in some form or other has occurred within the cells of the ovule parent.

Standard Herd Records

For Quarter ended 31st December, 1931

In the following is set out the records of all cows which completed a lactation during the quarter. The number is 385, of which 238 qualified for the certificate.

The amount of butter fat required for qualification varies according to the age of the animal (up to 5 years at time of calving), the standards being as follow:—

Junior 2 year old (under 2½ years at time of calving) .. .. .. 230 lb. butter fat.
Senior 2 year old (between 2½ and 3 years at time of calving) .. .. 250 lb. butter fat.
Junior 3 year old (between 3 and 3½ years at time of calving) .. .. 270 lb. butter fat.
Senior 3 year old (between 3½ and 4 years at time of calving) .. .. 290 lb. butter fat.
Junior 4 year old (between 4 and 4½ years at time of calving) .. .. 310 lb. butter fat.
Senior 4 year old (between 4½ and 5 years at time of calving) .. .. 330 lb. butter fat.
Mature cow 5 years and over .. .. 350 lb. butter fat.

(Except where otherwise stated, the period of Test was 273 days.)

Owner.	No. completed Test	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.			
Alston, N. B., Romsey (Jersey)	2	2	Rosyth Lady Jessie ..	26377	2.3.31	18	6,339	5·29	335·07	330	Sr. 4	276, 328
			Rosyth Meadow Sweet	26379	6.3.31	19½	6,579	4·83	317·54	290	Sr. 3	231, 261
Anderson, J., Lyndhurst (Jersey)	2	2	Kingsvale Linda 75th..	25717	22.1.31	17	5,856	5·43	317·71	270	Jr. 3	279
			Kingsvale Lady Monica 24th	25716	8.2.31	18	6,194	4·71	291·72	270	Jr. 3	256
Archibald and Son, Sale (Jersey)	1	..	Glenallan Tulip's Result	25723	6.1.31*	13½	4,620	4·55	210·30	270	Jr. 3	303
Archibald, L. R. Tongala (Jersey)	3	1	Lady Monica of Mayfield Park	17681	6.2.31†	4	4,485	5·04	226·07	350	Mature	246, 242, 276
			Mayfield Park Daisy 3rd	25724	8.3.31	17½	6,383	5·88	375·19	250	Sr. 2	304
			Carinya Rosalie ..	32887	24.3.31	20	4,928	4·24	208·74	230	Jr. 2	
Armstrong, W. J., Somerville (Jersey)	4	3	St. John's Rosebud ..	22932	4.2.31	23	7,662	4·73	362·09	330	Sr. 4	
			Glenone Duchess ..	28391	2.3.31	22	6,186	5·71	353·07	250	Sr. 2	
			Somerville Wynn ..	23229	12.3.31	17	7,091	4·30	305·13	350	Mature	
			St. John's Letitia 6th	22931	25.3.31	23	7,754	5·58	432·64	350	Mature	
Atherton, W. J., Murraydale (Jersey)	1	1	Beverley Tiny Lass 2nd	28391	11.2.31	17½	5,418	4·71	255·00	230	Jr. 2	
Atkinson, W. K., Swan Hill (Dairy Shorthorn)	8	6	Willow Park Butterfly	Vol. 1	16.1.31	20½	8,795	4·46	392·67	350	Mature	301, 356, 406
			Willow Park Dainty 2nd	Vol. 1	20.1.31	24	9,095	3·78	343·72	350	Mature	258, 342, 344
			Willow Park Damsel ..	Vol. 1	25.1.31	32	10,896	4·21	458·41	350	Mature	338, 409, 452, 380, 439, 538, 490
			Willow Park Fairy ..	Vol. 1	26.1.31	56	17,828	4·18	745·45	350	Mature	380, 528, 570, 646, 732, 712
			Willow Park Dulcie 2nd	Vol. 1	1.2.31	23½	11,037	4·01	478·13	350	Mature	320, 362, 415
			Willow Park Countess 7th	Vol. 1	4.3.31	15	5,220	4·47	233·14	230	Jr. 2	
			Willow Park Camella 2nd	Vol. 1	26.3.31	34½	10,857	3·83	415·47	350	Mature	288, 376, 427
			Willow Park Moss Rose 2nd	Vol. 1	29.3.31	19½	8,714	3·80	330·84	350	Mature	242, 309

* 240 days in Test. † Dried off. 210 days in Test.

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.			
Ballarat Orphanage, Ballarat (Jersey)	2	2	Orphanage Helen ..	32930	18.2.31	23	5,724	4·73	270·93	230	Jr. 2	
			Orphanage Mannikin's Attraction	32931	17.3.31	16½	4,629	5·62	260·30	230	Jr. 2	
Bassett-Smith, C., Kyabram (Red Poll)	1	..	Woodburn Dorcus ..	2098AA	9.3.31	14	5,097	3·86	196·67	230	Jr. 2	
Belfield, G. H., Coleraine (Jersey)	3	2	Wootong Vale Golden Buttercup	25756	23.2.31	12	7,292	4·55	332·09	310	Jr. 4	351, 395,
			Wootong Vale Vanilla's Princess	25760	25.2.31	24	6,512	4·93	321·20	290	Sr. 3	301
			Wootong Vale Marigold	25758	27.2.31	22	7,140	4·57	326·05	330	Sr. 4	330, 344
Black, Mrs. A. J., Noorat (Jersey)	5	5	Noorat Geranium ..	25269	11.3.31	14½	6,273	5·44	340·98	250	Sr. 2	288
			Noorat Sunshine ..	16219	24.3.31	28¾	8,814	5·21	458·86	350	Mature	265, 240, 415, 514, 506
			Noorat Sunny ..	32995	25.3.31	11	5,066	5·40	273·37	230	Jr. 2	
			Noorat Music ..	32993	26.3.31	13	5,922	5·31	314·75	230	Jr. 2	
			Ettie 8th of Banyule ..	14182	29.3.31	20½	8,093	5·36	434·02	350	Mature	386, 476, 438, 448
Black, I. S., Noorat (Ayrshire)	5	3	Peggy of Ben Kell ..	11349	16.2.31	16	7,334	4·73	345·72	350	Mature	297, 364, 283, 481, 396
			Mount Noorat Scottish Lassie	20556	6.3.31	24½	7,605	3·77	286·43	230	Jr. 2	
			Mount Noorat Pyrene	23140	13.3.31	14½	5,790	3·99	230·92	230	Jr. 2	
			Ben Kell Poppy 3rd ..	17318	23.3.31	12½	5,787	4·67	270·15	270	Jr. 3	275
			Ben Kell Pandora ..	15732	23.3.31	9½	7,671	3·80	291·78	310	Jr. 4	296, 274
Bolton, S., Mannerin (Jersey)	3	3	Glenmavis Surprise ..	24270	5.3.31	24½	7,925	4·96	393·35	290	Sr. 3	234, 354
			Daisy 5th of Somerset	17391	13.3.31	15	7,008	5·12	358·67	350	Mature	408
			Glenmavis Mayflower ..	28471	25.3.31	13½	5,298	5·31	281·08	250	Sr. 2	
Box, Dr. J., Whittlesea (Jersey)	1	1	Edmonton Chevy ..	33210	2.1.31	13	5,049	6·50	328·27	230	Jr. 2	
Broad, A. A., Sutton Grange (Jersey)	2	2	Grangelea Daisy 5th ..	26389	8.3.31	25½	8,025	4·71	378·28	290	Sr. 3	333
			Grangelea Daisylea 2nd	33035	27.3.31	17	5,450	5·42	295·62	230	Jr. 2	
Burley and Sons, Narre Warren North (Jersey)	2	..	Kingsvale Linda 73rd ..	25770	29.1.31*	4	4,195	5·71	239·51	310	Jr. 4	
			Canary 20th of Kingsvale	21085	27.2.31	9	4,202	6·80	285·61	330	Sr. 4	
Butcher, F. T., Murraydale (Red Poll)	1	1	Maryville Eve ..	2506c	9.2.31	20	6,960	5·10	355·03	230	Jr. 2	
Cameron and Sons, Valencia Creek (Jersey)	1	1	Studleigh Duchess 3rd	25289	1.1.31	23	7,581	5·87	444·65	290	Sr. 3	314, 434
Chadderton, J. E., Hamilton (Jersey)	3	3	Duchess of Glenleigh ..	15462	23.1.31	21½	7,228	6·61	477·69	350	Mature	410, 346, 489, 426
			Glenleigh Dora 2nd ..	28532	20.2.31	19½	6,135	5·80	355·61	230	Jr. 2	
			Glenleigh Duchess 5th	25792	16.3.31	15½	6,861	6·14	421·09	270	Jr. 3	338
Charlton, J., Stony Creek (Jersey)	1	1	Lumeah Lulu ..	24290	4.1.31	26	7,919	4·89	387·44	310	Jr. 4	297, 250
Chirnside, R. M., Whittlesea (Jersey)	3	3	Bruce Vale Fancy Madeira 2nd	25801	28.1.31	N.O.C.	6,329	6·70	423·87	290	Sr. 3	358
			Melrose Clementine ..	28551	29.1.31	N.O.C.	6,018	5·47	329·18	230	Jr. 2	
			Werribee Princess Madeira 2nd	33143	24.2.31	9½	3,877	6·83	264·99	230	Jr. 2	

* 240 days in Test.

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.			
Chitty, C., Kernot (Jersey)	1	1	Ewelme Mistress Nan	C.R.	3.1.31	14½	4,245	6·48	274·94	230	Jr. 2	
Clark, P. W., Whittlesea (Jersey)	2	2	Clovelly Sweet Briar ..	33166	7.2.31	16½	6,296	5·54	348·67	310	Jr. 4	
			Clovelly Annette 2nd ..	33165	25.3.31	13	4,811	5·89	283·57	270	Jr. 3	
Clark, W. J., Monomeith (Jersey)	1	1	Banyule Molly 27th ..	24460	7.1.31	5	7,977	4·87	388·27	270	Jr. 3	326
Clyne, J., Upper Maffra West (Jersey)	8	7	Playhour of Swansea ..	21196	4.1.31	12	6,192	6·29	389·63	330	Sr. 4	323
			Paisley Corolla ..	33176	11.1.31	17½	5,423	5·94	321·95	230	Jr. 2	
			Jersey Vale Jonquil ..	24540	1.2.31	18	6,068	5·00	303·15	290	Sr. 3	270
			Maitland Petal 2nd of Elouera	15468	5.2.31	31½	8,357	4·94	413·09	350	Mature	355, 375, 444, 486, 516
			Paisley Rose Petal ..	C.R.	28.2.31	17	5,228	5·92	309·50	230	Jr. 2	
			Paisley Peach ..	25326	2.3.31	14½	5,355	4·42	236·83	290	Sr. 3	190, 254
			Paisley Pearl ..	C.R.	15.3.31	19½	5,685	4·74	269·36	230	Jr. 2	
			Cora of Paisley ..	17720	29.3.31	22	7,658	5·33	408·45	350	Mature	302, 401, 368, 412
Cockbill Bros., Bacchus Marsh (Ayrshire)	3	2	Fulham Vivian ..	20031	28.12.30	11½	5,252	4·37	229·71	230	Jr. 2	
			Fulham Torture ..	14646	23.1.31	24½	8,997	3·99	359·11	350	Mature	242, 313, 312
			Fulham Dot ..	16056	19.2.31	21	8,996	4·35	391·22	330	Sr. 4	304
Cockbill Bros., Rockbank (Ayrshire)	3	2	Fulham Leila ..	17937	16.1.31*	4	3,217	4·90	157·56	290	Sr. 3	146
			Fulham Cassie ..	17934	2.3.31	12½	6,245	4·96	309·62	290	Sr. 3	237
			Fulham Vogue ..	22754	13.3.31	11½	4,347	5·32	231·28	230	Jr. 2	
Cockbill Bros., Tongala (Ayrshire)	3	1	Fulham Celia ..	20019	16.2.31	17	5,895	4·20	247·71	230	Jr. 2	
			Fulham Lyric ..	20024	24.2.31	7	4,845	3·99	193·37	230	Jr. 2	
			Fulham Veronica ..	14648	12.3.31†	N.O.C.	3,105	4·16	129·12	350	Mature	158, 144, 215
Cook, D. E., Loch (Jersey)	1	1	Wattle Vale Flirt ..	33198	12·2·31	13½	3,906	5·89	230·05	230	Jr. 2	
Coombes, T. A. P., Tongala (Jersey)	1	1	Strathbow Colina ..	26152	22.3.31	18	6,741	6·22	419·15	250	Sr. 2	
Coughlin, C., Yannathan (Jersey)	2	..	Aveley Valda's Petal ..	26314	12.1.31	19	4,667	5·44	254·10	290	Sr. 3	188, 258
			Karowarra Quicksilver	29016	15.1.31	16	5,552	5·38	298·50	310	Jr. 4	238, 304
Cox, A., Kyabram (Jersey)	8	6	Tavistock May ..	28611	1.1.31	11	5,676	6·01	340·97	250	Sr. 2	252
			Tavistock Lassie 2nd ..	28609	9.1.31	12	3,906	5·81	226·96	250	Sr. 2	249
			Tavistock Muriel ..	25818	14.1.31	16½	5,045	5·50	277·39	310	Jr. 4	244, 324
			Tavistock Clarionette 2nd	33218	4.2.31‡	15	4,372	6·05	264·50	250	Sr. 2	
			Tavistock Milkmaid 2nd	28616	12.2.31	18½	6,537	4·81	314·75	250	Sr. 2	203
			Belgonia Stumpy 3rd ..	29119	13.2.31	14	5,466	5·81	317·42	290	Sr. 3	294
			Tavistock Lassie ..	18458	6.3.31	30	9,330	5·33	497·14	350	Mature	370
			Tavistock Mystery's Duchess	23059	15.3.31	17½	8,292	4·71	390·26	330	Sr. 4	367
Day, E., Penshurst (Jersey)	2	2	View Point Golden Bright	24326	20.3.31	18	6,806	5·50	374·27	310	Jr. 4	263, 392
			View Point Duchess ..	24325	24.3.31	17	5,933	5·63	333·80	330	Sr. 4	314, 359
Dee, J., Clyde (Jersey)	1	..	Dainty of Clydevale ..	21245	19.3.31	10½	4,967	4·89	243·01	350	Mature	286,272
Department of Agriculture, Werribee (Friesian)	1	1	Victoria Lean Patch ..	1705	31.12.30	33	17,238	3·44	592·15	350	Mature	326, 306, 577, 506, 700

* 210 days in Test. † 180 days in Test. ‡ 240 days in Test.

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb		lb.			
Department of Agriculture, Werribee (Red Poll)	4	4	Victoria Velbit ..	2341A	30.12.30	18	7,703	4·26	328·06	290	Sr. 3	328
			Victoria Peace ..	2327A	3.2.31	22½	7,100	4·72	334·90	270	Jr. 3	309
			Victoria Euphrates ..	716A	11.2.31	27	9,659	3·78	365·04	350	Mature	247, 326, 394, 407
			Victoria Village Belle..	1522AA	24.3.31	26½	9,782	4·03	393·82	330	Sr. 4	357, 402
Desmond, J. J., Rochester (Jersey)	1	1	Preston May Day ..	25356	24.1.31	27	8,217	5·41	444·21	310	Jr. 4	312, 422
Dobson, R. J. M., Acheron (Jersey)	1	1	Wattle Grove July ..	33289	18.3.31	17½	5,517	4·62	254·92	230	Jr. 2	
Dookie Agricultural College, Dookie (Ayrshire)	4	4	Dookie Doe	17775	24.2.31	18	8,843	4·50	397·52	350	Mature	371, 299
			Dookie Diamond ..	21328	25.2.31	18	7,854	4·14	325·49	290	Sr. 3	335
			Dookie Ada	17773	18.3.31	23½	10,236	3·69	378·16	350	Mature	336, 312
			Dookie Beeswax ..	21327	28.3.31	19½	10,647	3·93	418·30	330	Sr. 4	345, 385
Ducat, P. J., and Sons, Ardmona (Jersey)	2	1	Airlie Pansy 2nd ..	28675	23.1.31	17	6,956	5·75	399·81	250	Sr. 2	309
			Airlie Buttercup 5th ..	33309	13.2.31	10	3,960	5·45	215·99	250	Sr. 2	
Edwards, T. J., Sale (Jersey)	2	2	Rockburn Trissie ..	30957	1.1.31	21	7,308	4·86	355·39	270	Jr. 3	264
			Sunny Brae Morocco ..	25363	18.1.31	20½	5,816	5·83	338·87	270	Jr. 3	330
Messrs. Elliott and Farr, Wimba (Jersey)	2	..	Molly 19th of Banyule	16692	1.1.31	14½	5,378	4·93	265·34	350	Mature	337, 338, 429
			Molly 23rd of Banyule	21432	24.3.31	20	5,210	4·64	241·75	310	Jr. 4	283, 245
Emmett, W. H., Stanhope (Jersey)	2	..	Pearl 2nd Goldie of Coolwoola	21764	7.3.31	15	5,409	5·58	301·73	350	Mature	
			Tavistock Molly 2nd ..	26034	22.3.31	19	5,647	5·02	283·53	310	Jr. 4	
Enders, A. E., Stanhope (Friesian)	3	3	Burnbank Majoe Maggie	3395	10.1.31	38	11,222	3·12	349·94	230	Jr. 2	
			Burnbank Alcartra Woodcrest	3390	22.1.31	38	11,292	3·42	385·75	230	Jr. 2	
			Burnbank Majoe Woodcrest	3033	29.3.31	45	15,243	3·42	521·65	310	Jr. 4	397, 410
Evans, A., Heywood (Jersey)	1	1	Boronia Farm May ..	23129	24.1.31	24	6,150	4·87	299·81	290	Sr. 3	236, 181
Fisken, A., Yendon (Milking Shorthorn)	1	..	Poplar Vale Princess 194th	Vol. 1	19.3.31	22½	6,407	4·09	262·23	330	Sr. 4	200
Fixter, A., Boisdale (Guernsey)	2	2	Fernlea Eva ..	2539	12.1.31	17	5,370	5·14	275·76	230	Jr. 2	
			Fernlea Daphne ..	2680	23.1.31	19	5,627	6·02	338·65	270	Jr. 3	296
Fixter, W., and Son, Boisdale (Jersey)	3	2	Studleigh Duchess 4th	25290	18.1.31	14	5,921	5·32	315·29	290	Sr. 3	274, 301
			Queenie of Riversdale	12922	20.1.31	13½	6,499	4·46	289·98	350	Mature	246, 325, 367, 379, 295
			Studleigh Duchess 6th	28698	10.3.31	13½	5,729	5·12	293·53	250	Sr. 2	265
Foster Bros., Boisdale (Jersey)	6	4	Brunette 22nd of Kingsvale	21084	3.2.31	16½	6,690	5·32	355·70	350	Mature	309, 407, 422
			Boisdale Brunette ..	25374	6.2.31	13	5,079	5·44	276·29	270	Jr. 3	257
			Jerseyholm Sparkle 11th	23146	9.2.31	20	6,518	6·91	450·32	310	Jr. 4	398, 392
			Boisdale Countess ..	33345	20.2.31	12	3,603	5·94	213·85	230	Jr. 2	
			Staghorn Master's Beauty	23148	23.2.31	23	7,344	5·20	382·06	310	Jr. 4	321, 414
			Boisdale Tulip ..	33348	5.3.31	12½	4,388	4·85	213·00	230	Jr. 2	

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.			
Fraser, G. A., Addington (Ayrshire)	1	1	Craigelea Flora ..	17683	1.3.31	24½	9,204	4·00	368·40	290	Sr. 3	326
Freestone, P., Murchison (Jersey)	2	2	Belgonia Romany Lass 3rd	29118	25.1.31	28½	7,496	5·52	413·48	270	Jr. 3	
			Jersey Vale Duchess ..	34008	26.1.31	17½	4,899	5·31	260·23	230	Jr. 2	
J. L. Gardiner, Welshpool (Jersey)	2	1	Lauriston Musical Belle	25892	10.1.31	14½	5,340	5·31	283·43	270	Jr. 3	231
			Lauriston Musical Princess	34016	2.4.31	16	4,964	4·54	225·58	250	Sr. 2	
Mrs. M. S. Gardner, Nilma (Jersey)	1	..	Melview Graceful Duchess 2nd	29392	5.3.31	15½	4,365	5·35	233·60	250	Sr. 2	
R. G. Gay, North Devon (Jersey)	3	3	Hill Crest Ramona ..	25997	23.3.31	14½	5,132	4·88	250·57	250	Sr. 2	171
			Buttercup of Elm Grove	21303	25.3.31	28½	9,450	5·29	500·21	350	Mature	450, 420
			Hill Crest Charmaine ..	25996	29.3.31	16	6,047	5·24	317·15	230	Jr. 2	213
Gibson Bros., Trafalgar (Jersey)	1	1	Leathorne Buttercup Gipsy Love	24362	4.3.31	15½	4,923	5·70	280·80	270	Jr. 3	229
A. W. Gorman, Alexandra (Ayrshire)	1	1	Ladylike of Cathcart ..	9143	28.3.31	23	10,350	4·25	439·82	350	Mature	269, 308, 283, 343, 346
V. Gregg, Whittlesea (Jersey)	3	1	Stoneycroft Blossom ..	28718	27.2.31	17½	5,859	5·90	345·90	310	Jr. 4	
			Stoneycroft Ino ..	21307	27.2.31	14	4,499	5·54	249·10	350	Mature	
			Una of Hill Crest ..	10293	24.3.31	18½	6,282	5·05	317·38	350	Mature	
E. Hall, Tongala East (Jersey)	1	1	Melwood Violet 2nd ..	34045	16.3.31	18	5,355	4·72	252·97	250	Sr. 2	
J. E. Handbury and Sons, Toora (Jersey)	4	3	Tooravale Lassie Fowler 4th	28734	9.1.31	14	4,856	5·29	256·76	250	Sr. 2	213
			Tooravale Maid's Princess 2nd	28735	18.2.31	13	4,799	6·20	297·69	250	Sr. 2	260
			Tooravale Lassie Fowler 3rd	28733	22.3.31	10½	4,490	5·40	242·39	270	Jr. 3	251
			Tooravale Noreen ..	23191	23.3.31	16½	5,466	6·72	367·39	310	Jr. 4	290, 293
D. C. Harker, Tyers (Aryshire)	2	..	Thirlmere Ada ..	20778	13.1.31	17½	5,144	4·18	214·84	230	Jr. 2	
			Thirlmere Perfume ..	22144	14.1.31	11	3,575	4·26	152·30	230	Jr. 2	
W. Harker, Caldermeade (Aryshire)	1	..	Clarice of Wayside ..	14904	10.1.31	25½	7,279	4·26	309·87	350	Mature	203, 337, 312
C. W. Harris, Merino (Jersey)	1	..	Goulburn Duchess 8th	23197	27.3.31	13	4,605	5·85	269·48	310	Jr. 4	327, 358, 381
Miss K. Harrison, Frankston (Jersey)	1	..	Walbundry Gama 2nd	33401	22.1.31	12	3,455	4·88	168·48	230	Jr. 2	
T. Harvey, Boisdale (Jersey)	2	2	Empress 8th of Jerseyholm	18735	24.1.31	17	7,718	5·71	440·91	350	Mature	216, 342, 378
			Empress 9th of Jerseyholm	21328	8.2.31	17	7,110	6·22	441·97	350	Mature	329, 406, 357

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.			
E. P. Hayes, Loch.. (Jersey)	2	1	Melrose Flower 19th ..	25693	29.1.31	21	6,036	6·07	366·43	310	Jr. 4	
			Melrose Lassie Fowler 15th	23534	13.3.31	12½	5,547	6·05	335·85	350	Mature	221, 297
W. Henderson, Dennington (Aryshire)	4	..	Fennella 5th of Carracoorte	9353	2.1.31	11	7,091	4·35	308·59	350	Mature	153, 215, 175, 245, 338, 263, 283
			Carracoorte Bellona 7th	17438	3.3.31	18	5,400	3·92	211·63	350	Mature	201, 181, 265, 212
			Viola 8th of Carracoorte	15863	6.3.31	N.O.C.	7,859	4·37	343·79	350	Mature	220, 284, 367
			Filpail 8th of Carracoorte	9362	14.3.31	20	6,239	4·05	252·69	350	Mature	237, 212, 197, 241, 309
W. Henderson, Grasmere (Aryshire)	5	3	Carracoorte Betsy 18th	17444	30.12.30	..	4,685	4·08	191·19	350	Mature	191, 131
			Carracoorte Bunty 9th	17453	9.2.31	25½	5,867	4·72	276·73	310	Jr. 4	231
			Carracoorte Filpail 15th	17461	20.2.31	26	6,975	4·90	341·80	310	Jr. 4	225
			Carracoorte Balm 8th..	17436	10.3.31	23	8,126	4·40	357·71	350	Mature	280, 306, 385
			Sparrovale Rhoda ..	16700	13.3.31	28½	9,345	4·02	375·62	350	Mature	341, 367
L. J. Herd, Heidelberg (Jersey)	1	1	Banyule Vivace ..	24475	19.3.31	15½	5,360	5·28	282·87	270	Jr. 3	247
L. G. Hore, Horsfield (Milking Shorthorn)	5	..	Melba 80th of Darbalara	..	18.1.31*	4	5,318	4·30	228·60	350	Mature	
			Ruby 16th of Darbalara	..	29.1.31	9	5,702	4·27	243·39	350	Mature	
			Virginia 26th of Darbalara	..	8.3.31†	4	4,560	4·12	187·71	350	Mature	
			Viola 39th of Darbalara	..	15.3.31	24½	8,516	3·72	317·18	350	Mature	220
			Melba 67th of Darbalara	..	16.3.31	4	2,925	3·98	116·27	350	Mature	
E. H. Howlett, Morwell (Jersey)	1	1	Latrobe Lily 6th ..	25417	10.3.31	21	5,522	5·27	291.04	250	Sr. 2	192
A. Hubbard, Yarra Glen (Ayrshire)	3	1	Emoh Ruo Mavis ..	19922	4.1.31	20½	5,868	4·28	251·29	230	Jr. 2	
			Emoh Ruo Diana ..	15977	5.2.31	19½	6,818	3·64	248·50	330	Sr. 4	289
			Alison of Sunnyside ..	14283	26.2.31	21	6,644	3·93	260·80	350	Mature	239
J. A. Huffer, Gormandale (Jersey)	1	..	Glen Valley Waverley Lass 5th	34096	7.3.31	14½	3,779	5·81	219·63	230	Jr. 2	
W. H. Hurrey, Koonwarra (Jersey)	1	1	Kooreena Carrie ..	25949	25.2.31	19	5,570	6·44	358·46	270	Jr. 3	256
J. Hutchinson and Son, Somerville (Jersey)	4	4	Somerville Perrees Primrose	24409	8.1.31	26½	7,679	5·67	435·38	310	Jr. 4	345, 379
			Somerville Rio Rita ..	28782	9.1.31	27	7,413	5·07	375·61	230	Jr. 2	
			Heroine of Somerville..	18758	5.3.31	35	10,830	4·24	458·70	350	Mature	307, 416, 416
			Somerville Babs 2nd ..	23225	6.3.31	25½	9,587	4·89	469·16	350	Mature	443, 409
A. B. Ingram, Powelltown (Illawarra Milking Shorthorn)	1	..	Elsie 7th of Glenburn	..	21.2.31	19	6,642	3·80	252·08	290	Sr. 3	210
L. W. Jakobi, Catani (Jersey)	1	1	Springhurst Laburnum 2nd	26348	12.3.31	18	5,336	5·64	301·17	250	Sr. 2	300
G. A. Kent, Archie's Creek (Ayrshire)	2	..	Woolamai Beaty ..	20894	24.2.31	9½	3,972	4·51	179·18	230	Jr. 2	
			Woolamai Priscilla ..	20904	21.3.31	15	4,913	4·61	226·33	250	Sr. 2	

* 240 days in Test. † 210 days in Test.

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.			
T. Knowles, Dandenong (Ayrshire)	1	1	Dandy Plum ..	17730	5.1.31	16½	8,244	4·10	337·81	270	Jr. 3	274
Messrs. Koenig Bros., Mooroopna North (Ayrshire)	1	..	Borinya Dainty ..	21064	1.2.31	19	6,977	3·22	224·64	230	Jr. 2	
P. H. Lawrence, Tarrawarra (Jersey)	4	3	Rainga Jessie's Progress	26009	26.2.31	15½	4,844	5·88	284·94	230	Jr. 2	
			Rainga Linda's Lotina	26010	16.2.31	16	4,995	5·10	254·58	230	Jr. 2	
			Charming Beauty of Blackwood Valley	14165	27.2.31	24	6,416	5·42	347·89	350	Mature	221, 357
			Rainga Noble Mannequin	26011	13.3.31	15	4,560	5·61	255·82	250	Sr. 2	
O. W. J. Leemon, Archie's Creek (Jersey)	4	..	Karalee Duchess 2nd..	34157	28.2.31	15½	5,075	4·55	230·78	250	Sr. 2	142
			Karalee Duchess ..	21261	17.3.31	N.O.C.	6,059	4·57	276·62	350	Mature	228, 253, 313, 257
			Valley View Miss Prim	C.R.	17.3.31	N.O.C.	3,438	5·46	187·82	230	Jr. 2	
			Valley View Heather ..	34158	28.3.31	N.O.C.	5,250	4·16	218·48	230	Jr. 2	
Mrs. E. M. Lennie, Tongala (Jersey)	3	1	The Valley Myra 5th ..	26023	29.12.30	17	5,577	5·36	298·94	290	Sr. 3	299, 227
			Burnside Claribelle ..	26016	5.1.31*	4	5,595	4·38	245·12	310	Jr. 4	295, 288
			Dahlia 3rd of the Valley	26018	27.1.31	18	4,727	5·62	265·50	270	Jr. 3	
Longerenong Agricultural College (Aryshire)	2	1	Longerenong Laurustine	21910	8.3.31	19	4,896	4.14	202·73	250	Sr. 2	
			Longerenong Bougainville	21907	22.3.31	22½	5,912	4·62	273·26	230	Jr. 2	
Mrs. L. Lowing, Tongala (Jersey)	3	2	Fern of Jersey Vale	19936	3.1.31	18	7,194	5·30	381·04	350	Mature	321, 283, 410
			Troed-Yr-Rhiw Tawelwych	26048	1.2.31	29½	9,704	4·40	426·96	290	Sr. 3	432, 475
			Pansy 2nd of Jersey Vale	21424	17.2.31	18	4,826	5·32	256·91	350	Mature	302, 410, 329
C. G. Lyon, Heidelberg (Jersey)	8	8	Banyule Silvermine 49th	24469	18.1.31	17½	7,961	5·25	418·18	270	Jr. 3	282
			Tiddlewinks of Banyule	11613	25.1.31	22	7,868	5·58	439·34	350	Mature	441, 462, 578, 492, 447
			Silvermine 42nd of Banyule	21435	8.2.31	27½	8,559	5·96	509·93	330	Sr. 4	344, 406
			Banyule Silvermine 48th	24468	14.2.31	21½	7,301	5·33	388·79	270	Jr. 3	285
			Banyule Molly 28th ..	24461	23.2.31	21½	7,240	6·21	449·87	270	Jr. 3	321
			Banyule Silver Mist ..	25468	28.2.31	21	6,816	4·93	335·80	230	Jr. 2	
			Ettie 10th of Banyule	21431	7.3.31	28½	10,022	5·10	510·64	330	Sr. 4	378, 404
			Banyule Silvermine 56th	25474	21.3.31	13½	5,262	5·36	282·05	230	Jr. 2	
C. W. W. Macauley, Rochester (Jersey)	1	1	Taranah Royal Rose 2nd	29088	2.3.31	10	3,965	5·88	233·14	230	Jr. 2	198
J. McDougall, Byaduk (Jersey)	3	3	Parkview Mayflower ..	24479	10.3.31	17	6,537	5·64	368·77	310	Jr. 4	326, 330
			Parkview Fairy ..	24478	14.3.31	17	6,681	4·86	324·45	310	Jr. 4	284, 272
			Parkview Nola ..	24480	22.3.31	15½	6,587	5·70	375·38	310	Jr. 4	311, 371
Messrs. I. McErvale and Son, Camperdown (Jersey)	1	1	Glenfield Tottie ..	29056	5.3.31	15	5,616	4·54	254·80	230	Jr. 2	

* 240 days in Test.

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.			
K. McGarvie, Pomborneit (Jersey)	5	5	Greenwood Briar ..	C.R.	8.2.31	21¼	5,543	4·81	266·77	230	Jr. 2	
			Greenwood Beryl ..	C.R.	13.2.31	..	4,350	5·97	259·91	230	Jr. 2	
			Greenwood Affiance ..	25501	26.3.31	17⅛	6,159	5·32	327·45	270	Jr. 3	325
			Greenwood Actress ..	25495	28.3.31	19	6,990	5·01	350·50	290	Sr. 3	311
			Greenwood Acrasia ..	25494	28.3.31	4	5,351	5·64	301·79	270	Jr. 3	302
A. A. McInnes, Gunbower (Dairy Shorthorn)	1	..	Loch Ness Pearl Beauty	Vol. 1	22.1.31	7	3,441	4·38	150·65	230	Jr. 2	
Messrs. McNabb and Son, Irrewillipe East (Jersey)	8	7	Maxon Lodestone ..	29076	22.1.31	13	4,130	6·18	255·42	250	Sr. 2	255
			Staghorn Morocco's Primrose	25544	9.2.31	24	5,909	4·63	273·79	310	Jr. 4	289, 341
			Boorene Lux ..	24244	13.2.31	24	6,765	5·11	345·44	330	Sr. 4	295
			Easter Daisy of Springhurst	21607	14.2.31	24½	8,807	4·41	388·18	350	Mature	293, 360, 413
			Boorene Silvermine's Clara	25250	9.3.31	16	7,743	5·54	429·30	350	Mature	364, 354
			Maxon Sweet Marie ..	29082	13.3.31	21	6,695	5·39	360·97	250	Sr. 2	282
			Maxon Noble's Queen	29079	19.3.31	15	5,741	4·69	269·35	250	Sr. 2	252
			Maxon Alsyke ..	34216	23.3.31	17	5,158	5·17	266·55	230	Jr. 2	
Mesdames McWhae and Silverster, Merino (Guernsey)	2	..	Wollongbar Bel Air 15th	1553	1.1.31	6	3,744	4·76	178·08	350	Mature	245, 188
			Talisker Sweet Vernal	2651	14.2.31	11	3,388	5·06	171·51	230	Jr. 2	
Messrs. Maher Bros., Seymour (Ayrshire)	1	1	Satinbird of Gowrie Park	13854	20.3.31	19	9,846	3·99	393·30	350	Mature	368, 295
Dr. Ramsay Mailer, Shepparton (Jersey)	1	1	Maneroo Daisy 4th's Buttercup	33494	11.1.31	27	5,868	5·14	301·62	230	Jr. 2	
A. R. Marshman, Archie's Creek (Jersey)	1	..	Forgan Bloom ..	33509	28.3.31	9	4,277	5·60	239·38	250	Sr. 2	172
S. H. Masters, Murraydale (Jersey)	1	1	Rutland Brunette ..	29130	10.3.31	23½	6,609	4·89	323·40	250	Sr. 2	313
E. M. Middleton, Hamilton (Jersey)	2	..	Kyora Foch's Starbright 3rd	29161	2.2.31	N.O.C.	4,250	6·35	269·79	270	Jr. 3	250
			Peerless Corolla of Rosevale	16732	27.2.31	N.O.C.	6,732	4·23	284·67	350	Mature	
R. K. Milne, Camperdown (Jersey)	2	1	Allambie Bonnie ..	25613	16.3.31	8½	6,704	4·40	294·89	330	Sr. 4	
			Castlemaddie Cornflower 3rd	25282	23.3.31	15½	5,445	5·41	294·83	270	Jr. 3	209, 308
J. Moore and Co., Yarram (Jersey)	3	..	Tooloonook Trixie 2nd	23332	16.2.31*	4	3,315	5·59	185·19	350	Mature	304
			Birthday's Verbeena of Belle Vue	14619	16.3.31	6½	3,227	4·88	157·42	350	Mature	276
			Tooloonook Cheeky 3rd	Vol. 19	17.3.31†	4	3,000	5·79	173·55	230	Jr. 2	
E. Nicholls, Springhurst (Jersey)	6	2	Nickel Bar Opal ..	33566	8.2.31	17	4,931	4·58	225·70	230	Jr. 2	
			Maize Chief's Bessie of Blowering	21538	28.2.31‡	4	2,205	6·12	135·00	350	Mature	287, 172
			Phoebe of Blowering ..	18878	4.3.31	19	6,818	5·34	364·17	350	Mature	370, 364, 308
			Nickel Bar Ruby ..	26114	21.3.31	14	5,222	5.57	290·88	290	Sr. 3	259, 320
			Nickel Bar Jonquil ..	26112	28.3.31	8	5,493	4·81	264·08	290	Sr. 3	194
			Daisy Bell of Blowering	18876	28.3.31	7	5,600	4·70	262·98	350	Mature	251, 238, 250

* 210 days in Test. † 180 days in Test. ‡ 150 days in Test.

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.			
E. H. Nolte, Merino (Jersey)	3	1	Nairana Semiramus ..	29258	10.3.31	16	4,413	6·19	273·27	290	Sr. 3	
			Cloth of Gold 4th of Clover Flat	Vol. 19	11.3.31	24	7,838	4·78	374·43	350	Mature	
			Nairana Virginia 3rd ..	29269	24.3.31	17	4,863	5·55	269·92	270	Jr. 3	
B. R. O'Meara, Caldermeade (Ayrshire)	2	..	Hillcrest Lyla ..	21750	9.1.31	15½	5,010	4·29	214·74	230	Jr. 2	
			Queenie of Waverley ..	7520	11.2.31	9	6,947	3·79	263·87	350	Mature	424, 431
W. H. Onley, Caldermeade (Aryshire)	1	..	Holm Thelma ..	20350	22.3.31	13½	6,471	4·27	276·36	310	Jr. 4	178, 258
Mrs. L. Orchard, Grahamvale (Jersey)	5	..	Jersey Vale Gaiety ..	24536	5.1.31	16	6,050	4·61	278·74	350	Mature	214
			Laura of Jersey Vale..	24541	10.1.31	19	5,869	4·89	286·88	350	Mature	268, 285
			Pearl of Jersey Vale ..	15581	8.3.31	4	4,417	4·98	219·79	350	Mature	202, 220, 285, 311, 277
			Rose of Jersey Vale ..	9590	18.3.31	12	6,325	4·34	274·48	350	Mature	198, 236, 225, 321, 251, 222, 318, 285
			Jersey Vale Lassie ..	C.R.	24.3.31	17	5,783	5·33	308·18	350	Mature	231, 323
Mrs. A. C. Overend, Sale (Jersey)	4	3	Bon Accord Sally ..	29285	7.2.31	10	4,880	5·67	276·66	270	Jr. 3	187
			Waratta Elvie Bell ..	23504	11.2.31	13	5,689	5·30	301·76	310	Jr. 4	264, 265
			Waratta Emma Bell ..	23505	23.2.31	17	5,889	5·90	347·58	310	Jr. 4	314, 324
			Bon Accord Belle ..	33576	27.3.31	11½	5,006	5·84	292·57	230	Jr. 2	
W. Parbury, Warburton (Jersey)	2	1	Brookfield Beauty 11th	29286	31.1.31	23	6,158	5·12	315·41	270	Jr. 3	306
			Daisy 3rd of Brookfield	15585	12.3.31	19	5,163	5·50	283·91	350	Mature	360, 312, 349
F. Pattison, Tongala (Ayrshire)	2	2	Willow Park Fairy ..	22241	12.1.31	17	6,518	3·98	259·61	230	Jr. 2	
			Willow Park Pearl ..	22243	28.1.31	18	6,250	4·15	259·60	230	Jr. 2	
J. Pearson, Neerena East (Jersey)	1	1	Music of Linga Longa..	17698	15.3.31	16	6,240	5·68	354·43	350	Mature	297, 336, 371, 385
Messrs. Pettitt Bros., Geelong (Ayrshire)	3	2	Blinkbrae Mavis ..	19562	10.1.31	13½	6,521	3·87	252·66	230	Jr. 2	
			Blinkbrae Beautiful 2nd	15762	24.1.31	17	8,514	4·63	394·11	290	Sr. 3	260, 285
			Melba of Blinkbrae ..	12669	12.2.31	7	5,814	4·18	242·83	350	Mature	257, 287
J. Phillips, Murraydale (Jersey)	1	..	Peri Vanilla 2nd ..	23367	10.2.31	15½	5,548	6·11	338·71	350	Mature	220, 313, 299
J. Plattfuss, Tongala (Friesian)	7	5	Greenvale Duchess Paxton	2768	1.1.31	19	13,542	3·32	449·73	350	Mature	325, 466, 440
			Greenvale Juno Rose 2nd	1570	8.1.31	18½	15,203	3·19	484·26	350	Mature	349, 544, 473, 470
			Greenvale Rosie Key's 2nd	3494	21.1.31	35	9,564	2·92	279·18	270	Jr. 3	241
			Burnbank Pietertye Girl	2387	21.1.31	28½	8,883	3·31	293·68	350	Mature	267, 263
			Glen Elgin Clarice ..	2453	28.1.31*	4	10,545	4·03	424·68	350	Mature	488, 490, 492
			Greenvale Daphne ..	C.R.	24.2.31	7½	6,932	3·21	222·60	230	Jr. 2	
			Westmere Oakwood Duchess	602	1.3.31	14	12,513	3·56	445·31	350	Mature	352, 319, 638, 703, 817, 687, 653, 445
Mrs. M. A. Poole, Caldermeade (Ayrshire)	2	1	Ryeland's Marcia ..	20717	14.2.31	16½	5,216	4·69	244·67	250	Sr. 2	
			Ryeland's Fairy ..	20714	11.3.31	14	5,570	5·25	292·29	270	Jr. 3	

* 240 days in Test.

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.			
A. Prout, Leongatha (Jersey)	1	1	Wattle Vale Wild Flower	23380	13.3.31	33½	9,206	5·04	464·41	350	Mature	409, 402
R. Purnell, Moriac .. (Jersey)	1	..	Narrawong Laurie 2nd	34291	14.3.31	13	3,758	6·05	227·40	230	Jr. 2	
Miss H. E. Raleigh, Pakenham Upper (Jersey)	1	..	Trumpet Daffodil of Goronga Farm	21597	5.1.31	13	5,436	5·64	306·48	350	Mature	269, 345
J. D. Read, Springhurst (Jersey)	6	6	Tecoma of Springhurst	12225	5.3.31	33½	10,682	5·25	561·11	350	Mature	288, 428, 430, 484, 565, 605, 500
			Springhurst Nightshade 3rd	26170	21.3.31	16	5,615	6·62	371·61	250	Sr. 2	361
			Nardoo of Springhurst	18936	21.3.31	27	9,702	6·37	618·07	350	Mature	301, 458, 386, 553
			Springhurst Tazerim ..	26173	23.3.31	9	5,759	5·79	333·26	250	Sr. 2	307
			Springhurst Aconite 2nd	29328	25.3.31	10½	3,890	6·46	251·17	230	Jr. 2	
			Springhurst Melilot 3rd	26167	28.3.31	14	6,207	6·27	389·41	250	Sr. 2	324
Miss S. L. Robinson, Kew (Jersey)	1	..	Kyora Sultan Adore ..	17482	1·3·31	14½	5,078	4·80	243·81	350	Mature	219
W. P. Rogen, Tatura (Jersey)	2	2	Kantara Jessamine ..	29380	15.1.31	22	6,716	4·42	297·01	230	Jr. 2	
			Kantara Nanette ..	26202	5.2.31	27½	7,538	5·60	421·81	270	Jr. 3	413
D. M. Ryan, Colac.. (Illawarra Milking Shorthorn)	2	2	Glengowrie Tottie 7th	2855	16.3.31	11½	8,076	4·26	344·04	270	Jr. 3	284
			Bona Vista Hope 3rd..	2851	23.3.31	17	9,363	3·34	313·17	200	Sr. 3	382
Salesian College, Sunbury (Ayrshire)	1	1	Thelma of Roseleigh ..	12111	4.2.31	13½	9,228	3·95	364·65	350	Mature	295, 308, 370, 300, 334
A. A. Schier, Kernot (Ayrshire)	15	1	Scotswood Maple ..	22076	3.1.31	10	4,062	4·61	187·28	230	Jr. 2	
			Scotswood Bonnie ..	16604	5.1.31	10	4,965	5·18	257·11	350	Mature	231, 245, 242
			Scotswood Dolly Brown	22068	23.1.31	17	5,306	4·10	217·59	230	Jr. 2	
			Scotswood Merline ..	15487	29.1.31*	4	4,658	4·55	211·93	350	Mature	221, 191, 153, 249, 225, 226
			Scotswood Gwen ..	22072	3·2·31	16½	4,494	4·46	200·56	230	Jr. 2	
			Scotswood Modena 2nd	20743	3.2.31	8	4,767	4·55	217·02	270	Jr. 3	187
			Wanda of Ben Kell ..	11352	4.2.31*	4	6,045	4·96	299·84	350	Mature	227, 315, 350, 317, 288
			Scotswood Joybell ..	18918	6.2.31	20	6,482	4·54	294·48	310	Jr. 4	288, 330
			Scotswood Beryl 2nd..	20731	9.2.31	15	5,712	3·90	222·60	250	Sr. 2	228
			Scotswood Better Still	15470	19.2.31	9	5,797	3·50	203·14	350	Mature	178, 159, 222, 182
			Scotswood Fine Quality	23225	20.2.31	5	3,336	4·94	164·87	230	Jr. 2	
			Scotswood Dainty Lass	20734	24.2.31†	4	2,625	4·15	108·94	250	Sr. 2	77
			Scotswood Future 2nd	18915	1.3.31	6	6,134	3·71	227·80	310	Jr. 4	276, 233
			Scotswood Goldlace 2nd	20735	16.3.31	13	4,481	4·70	210·82	250	Sr. 2	168
			Scotswood Primrose 2nd	20747	26.3.31	21	6,985	3·96	276·82	270	Jr. 3	238
A. J. Schlipalius, Kilmany South (Jersey)	2	..	Fairbank Melba ..	23433	4.1.31	9	4,965	5·34	265·01	310	Jr. 4	252, 251
			de Lecq Northwood Maid	29446	11.3.31	11	3,078	6·29	193·55	230	Jr. 2	
T. J. Scott, Rochester (Jersey)	1	1	Fairhope Magnet ..	21398	24.2.31	30	8,687	6·44	559·43	330	Sr. 4	512
T. Sebire, Wandin Yallock (Jersey)	1	..	Pretty Pet of Willis Vale	13228	8.1.31	..	4,484	5·74	257·16	350	Mature	

* 240 days in Test. † 210 days in Test.

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.			
Messrs. Simpson and Son, Lower Ferntree Gully (Jersey)	3	3	Matilda of Dalebank ..	15063	3.1.31	21	7,206	5·78	416·79	350	Mature	398, 422
			Hazeldale Bracelet ..	25551	22.2.31	25	8,053	5·55	446·76	310	Jr. 4	332, 404
			Wompini Song Bird ..	Vol. 19	26.3.31	21½	6,171	5·25	324·27	230	Jr. 2	
G. and W. Smith, Fish Creek (Jersey)	1	1	Rydon Rosalind ..	29491	21.1.31	20	5,369	6·25	335·39	230	Jr. 2	
Mrs. L. T. Stoll, Rokeby (Jersey)	1	..	Clarendon Eyre Pretty Peggy	29627	17.2.31	15	5,022	4·99	250·38	290	Sr. 3	
Messrs. Sutton and Son, Callignee (Jersey)	3	2	Glenvalley Lass ..	28982	4.1.31	11	5,252	5·69	299·03	270	Jr. 3	
			Latrobe Connie ..	24396	21.1.31	12	6,567	5·02	329·82	290	Sr. 3	
			Latrobe Hazel ..	28970	18.3.31	12½	3,852	4·61	177·58	230	Jr. 2	
W. G. Taylor, Caldermeade (Ayrshire)	2	1	Eldorado Bright Star..	19866	9.2.31	20½	5,994	3·96	237·31	230	Jr. 2	
			Bright of Glen Alvie ..	11160	12.2.31	21½	7,655	4·37	334·69	350	Mature	3 67, 445, 430
B. G. Tomasetti, Drouin West (Ayrshire)	5	4	Leithvale Ella ..	20465	17.2.31	14	5,982	4·88	291·71	250	Sr. 2	
			Glencorren Modena ..	21506	21.2.31	19	7,001	4·57	320·01	230	Jr. 2	
			Glencorren Madge ..	20119	24.2.31	17	5,331	4·32	230·35	230	Jr. 2	
			Glencorren Nellie Ray	21507	4.3.31	16	6,093	4·37	266·45	230	Jr. 2	
			Spring Mount Nellie Kelly	14956	18.3.31	19	8,585	3·90	334·40	350	Mature	198
T. H. Trigg, Dennington (Jersey)	1	1	Lipook's Butter Queen 3rd	25633	24.3.31	22	8,059	4·26	343·09	310	Jr. 4	318
J. Unthank, Somerville (Jersey)	2	2	Mooroodue Maisie ..	29561	14.2.31	7	3,411	7·48	254·99	250	Sr. 2	200
			Mooroodue Nell ..	33858	5.3.31	12½	3,908	6·43	251·39	230	Jr. 2	
E. J. Vagg, Leongatha (Jersey)	1	1	Lady of Queen's Vale..	19963	9.1.31	26	8,568	5·69	487·66	350	Mature	431, 451, 452
J. K. Van Brummelen, Ferntree Gully (Friesian)	3	2	Bolero La Polkad Dot	C.R.	9.1.31	20	7,023	3·62	254·06	230	Jr. 2	
			Bolero Inka Blanchje..	3352	16.2.31	32½	9,028	3·46	312·11	230	Jr. 2	
			Bolero Inka Rosey ..	2098	25.2.31	33	10,251	3·18	326·33	350	Mature	
Messrs. Vaughan Bros., Girgaree (Jersey)	7	7	Lynroy Olive 5th ..	29570	1.1.31	10½	5,744	5·12	293·93	250	Sr. 2	319
			Lynroy Bluebell ..	Vol. 19	2.1.31	16	7,120	5·21	371·21	230	Jr. 2	
			Lynroy Pansy 2nd ..	C.R.	17.1.31	16½	4,998	5·84	291·87	250	Sr. 2	
			Lynroy Jean 3rd ..	26268	18.1.31	14	6,407	6·00	384·19	310	Jr. 4	
			Lynroy Viola 3rd ..	Vol. 19	22.1.31	15½	5,601	5·98	335·11	230	Jr. 2	
			Lynroy Violet ..	33862	30.1.31	18	5,882	5·29	311·27	230	Jr. 2	
			Lynroy Doreen ..	C.R.	15.3.31	15½	5,620	5·94	333·63	250	Sr. 2	261
C. S. Walker, Swan Hill (Jersey)	1	..	Warwick Princess Mary	33878	3.2.31	9½	4,390	4·89	214·79	230	Jr. 2	
A. Wallace, Bendigo (Ayrshire)	4	..	Spring Dale Model ..	22085	29.12.30†	11½	2,070	4·51	93·34	200	Jr. 2	
			Spring Dale Victoria ..	20755	5.1.31†	12	2,090	4·52	94·42	200	Jr. 2	
			Glen Cooee Daffodil ..	16119	16.2.31	12½	5,972	4·06	242·43	330	Sr. 4	292
			Glen Cooee Wildflower	16128	23.2.31*	8	4,905	4·51	223·87	330	Sr. 4	276
Warragul High School, Warragul (Red Poll)	2	1	Gipps Vesta ..	21891	31.12.30	8	4,136	4·18	173·09	230	Jr. 2	
			Gipps Thera ..	21881	3.2.31	19½	5,862	4·48	262·47	250	Sr. 2	
J. S. Watts, Stanhope (Jersey)	1	1	Langi Rosebud ..	29593	25.1.31*	19	5,085	6·11	310·76	230	Jr. 2	316

* 240 days in Test. † 120 days in Test (withdrawn).

STANDARD HERD RECORDS—*continued.*

Owner.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Milk last day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Class.	Previous Yields of Butter Fat.
						lb.	lb.		lb.			
H. L. Webb, Sunbury (Ayrshire)	7	1	Holly Green Quiver ..	18276	6.1.31	5½	4,908	4·39	215·69	310	Jr. 4	166, 205
			Marita of Holly Green	15628	11.1.31	7½	5,982	4·62	276·61	350	Mature	158, 210, 114
			Lily's Queen of Holly Green	11495	11.1.31	15½	8,501	3·89	330·55	350	Mature	252, 404, 388, 341, 331, 410, 329, 324
			Holly Green Constance	18268	17.1.31	14	5,572	4·54	252·73	270	Jr. 3	236
			Holly Green Rarity ..	18277	23.2.31	15	5,943	4·33	257·35	270	Jr. 3	184
			Holly Green Aletta ..	20334	24.2.31	27	8,324	3·76	312·91			
			Holly Green Aggie ..	18266	18.3.31	11½	7,119	3·51	250·13	270	Jr. 3	209
J. C. West, Notting Hill (Illawarra Milking Shorthorn)	8	4	Rainbow 4th of Alne Bank	14321	25.1.31	21	6,942	3·57	247·51	270	Jr. 3	
			Daisy 5th of Allawalla	8158	27.1.31	20½	5,340	4·65	248·27	230	Jr. 2	
			Glenbrook Madge 2nd	2862	2.2.31	12½	5,280	4·13	217·81	230	Jr. 2	
			Elsie 5th of Allawalla..	7151	3.2.31	21½	6,788	3·90	265·00	250	Sr. 2	
			Empress 7th of Allawalla	8157	6.2.31	20½	5,790	4·07	235·65	250	Sr. 2	
			Rosemont Cinderella 6th	9742	9.2.31	27½	7,013	3·83	268·60	230	Jr. 2	
			Rosemont Comet 6th..	2865	12.2.31	16	4,970	3·96	196·90	230	Jr. 2	
			Rosemont Birdie 4th..	2863	16.3.31	20½	6,470	3·56	230·51	230	Jr. 2	
W. O. Westlake, Portland (Jersey)	2	2	Ranee of Cloverfield ..	21741	21.1.31	27½	7,896	4·85	383·16	350	Mature	358, 365, 405
			Cloverfield Merle ..	23517	25.1.31	22	6,996	5·06	353·71	350	Mature	315, 341, 390
J. Wilmot, Bullarook (Jersey)	1	1	Banyule Silvermine 58th	29032	5.2.31	18½	5,581	5·52	308·05	230	Jr. 2	
D. C. Wilson, Derrinallum (Jersey)	1	..	Ayton Law Fern ..	25654	2.3.31	20	5,144	4·60	236·54	250	Sr. 2	229
J. V. M. Wood, Heidelberg (Jersey)	6	5	Clarendon Eyre Rose Marie 2nd	Vol. 19	4.1.31	20	6,239	5·45	339·97	230	Jr. 2	
			Clarendon Eyre Pinafore 2nd	Vol. 19	23.1.31	17½	5,431	5·35	290·50	230	Jr. 2	
			Glenesk Lilac Domino	..	12.2.31	N.O.C.	4,977	6·15	306·19	230	Jr. 2	
			Clarendon Eyre La Mascotte	24673	14.2.31	N.O.C.	6,657	5·92	394·37	310	Jr. 4	305, 404
			Clarendon Eyre Little Buttercup 2nd	29624	23.2.31	N.O.C.	7,343	5·93	435·38	270	Jr. 3	370
			Clarendon Eyre Rose Marie	33949	25.2.31*	4	5,085	5·14	261·35	290	Sr. 3	367
W. Woodmason, Oakleigh (Jersey)	5	5	Melrose Lassie Fowler 17th	33963	3.1.31	17½	4,719	5·80	273·80	230	Jr. 2	
			Melrose Jessie 49th ..	25702	4.1.31	24½	7,143	5·00	356·88	310	Jr. 4	227
			Melrose Empire 9th ..	23529	9.1.31	9	8,460	5·50	465·13	350	Mature	343, 446, 410 450, 384
			Melrose Jenny Lind 23rd	29650	10.1.31	32	9,066	5·10	462·45	270	Jr. 3	350
			Melrose Handsome Girl 15th	33962	26.1.31	19	5,892	6·22	366·36	250	Sr. 2	
G. T. Young, Sedgwick (Jersey)	3	3	Preston Bright Jewel..	33970	17.1.31	21	6,465	6·17	398·82	230	Jr. 2	
			Preston Daffodil ..	29064	14.2.31	29	7,919	5·17	409·40	270	Jr. 3	358
			Preston Star Princess..	33975	3.3.31	23	6,762	4·78	323·22	230	Jr. 2	

ERRATA.

T. R Findlay, Leitchville (Jersey)	..	..	Leven Brae Joyce† ..	C.R.	3.11.30	14	4,739	5·51	260·97	230	Jr. 2	
T. J. Scott, Rochester (Jersey)	..	..	Fairhope Magnet‡ ..	21398	24.2.30	24	7,488	6·84	512·23	275	Sr. 3	

* 240 days in Test. † Published incorrectly in December Report in Sr. 2nd Class.
‡ Published incorrectly in Sr. 4th Class in March, 1931, Report.

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Use the most reliable specific on the market for the prevention of blowfly strike of stock wounds. Shell Defiance Blowfly Oil is soothing and healing in its action; it does not poison, and it resists removal from the wool by rain or sunshine for long periods.

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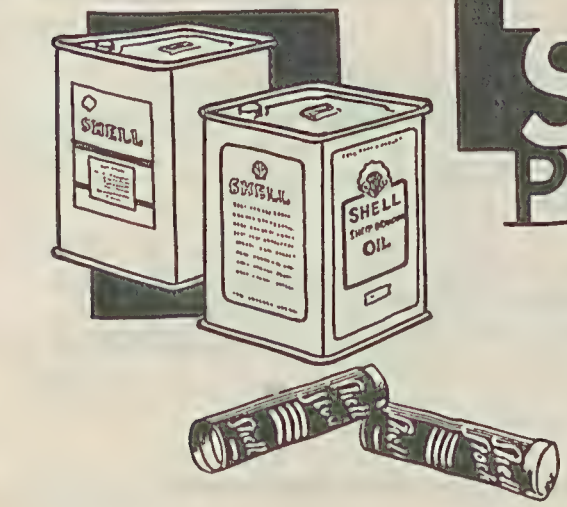

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Sterilized Poultry Food

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Department of Agriculture, Victoria

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10 lb. of Choice Butter	17	6
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1 carcass of Prime Lamb ..	25	0
24 tins of Assorted Jam	32	6
24 pint bottles Assorted Wine ..	40	0
1 case of fresh Apples (from February to May only)	17	6

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1-lb. Carton of Butter	1 Tin of Apricots
1-lb. ,, Sultanas	1 ,, Peaches
1-lb. ,, Raisins	1 ,, Pears
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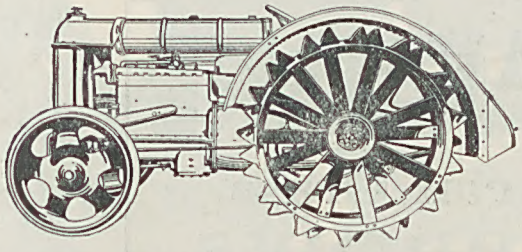
3 Pint Bottles of Wine .. for 17s. 6d.

£50 Deposit! Balance over Two Crops



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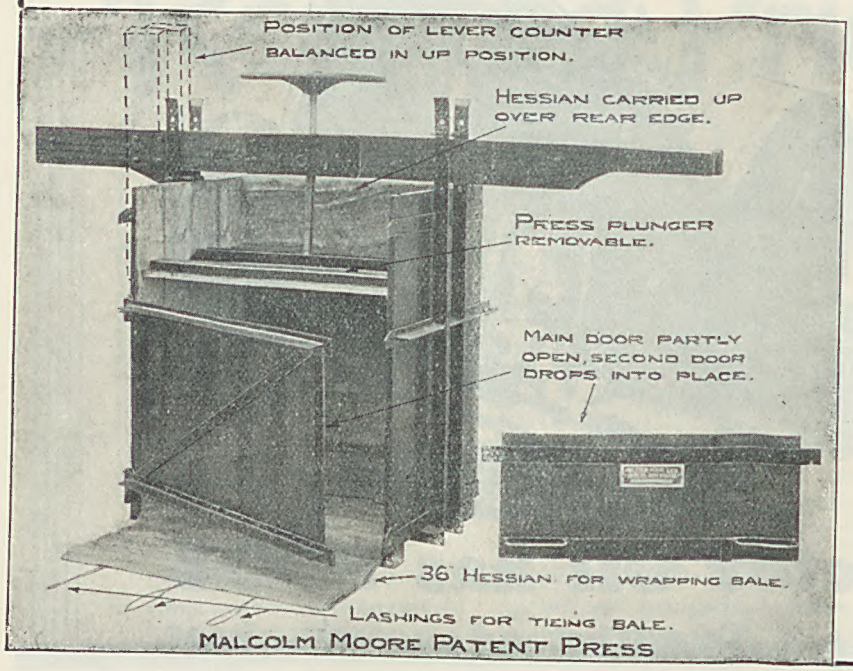
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No. 6—Ex Victoria Velbit (2341 A) Dropped 9th Jan., 1932 .. 17 ,,
No. 7—Ex Victoria Amara (1649 A) Dropped 27th Jan., 1932 .. 30 ,,
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No. 9—Ex Victoria Longbird (1158 A) by Victoria Royal Ringer (818 AA) Dropped 4th Jan., 1932 .. .. 22 ,,
No. 10—Ex Victoria Peace (2327 A) by Victoria Vice-Captain ("A" Class, Vol. 6) .. .. 18 ,,

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